



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

**Division of Facilities Construction and Management**

DFCM

**Request For Bids For Construction Services  
Two-Stage Bidding Process**

**Stage II – General Contractor's Bidders List  
Invitation to Bid**

May 22, 2006

**JOINT OPERATIONS CENTER  
REMODEL  
DRAPER HEADQUARTERS**

**UTAH NATIONAL GUARD  
DRAPER, UTAH**

DFCM Project No. 06036480

L.K. Sorenson Associates

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Current copies of the following documents are hereby made part of these contract documents by reference. These documents are available on the DFCM web site at <http://dfcm.utah.gov> or are available upon request from DFCM:

DFCM General Conditions dated May 25, 2005

DFCM Application and Certificate for Payment dated May 25, 2005

Technical Specifications:

Drawings:

**The Agreement and General Conditions dated May 25, 2005 have been updated from versions that were formally adopted and in use prior to this date. The changes made to the General Conditions are identified in a document entitled Revisions to General Conditions that is available on DFCM's web site at <http://dfcm.utah.gov>**

# **INVITATION TO BID**

**ONLY CONTRACTORS PREVIOUSLY SHORT-LISTED DURING STAGE I  
ARE ALLOWED TO BID ON THIS PROJECT**

The State of Utah - Division of Facilities Construction and Management (DFCM) is requesting bids for the construction of the following project:

**JOINT OPERATIONS CENTER REMODEL – DRAPER HEADQUARTERS**  
**UTAH NATIONAL GUARD – DRAPER, UTAH**  
**DFCM PROJECT NO: 06036480**

Project Description: Interior remodel of classroom space to create two partitioned work spaces as per drawings and specifications. Project includes two new rooftop HVAC units to condition the new partitioned space. Construction Cost Estimate: \$130,000.00

<u>FIRM NAME</u>	<u>POINT OF CONTACT</u>	<u>PHONE</u>	<u>FAX</u>
ABCO Construction, Inc.	Mr. Reed Price	(435) 723-3770	(435) 723-3311
Ascent Construction	Mr. Dan Wall	(801) 299-1711	(801) 299-0663
Bellock Construction, Inc	Ms. Melody Bellock	(801) 277-7805	(801) 277-5751
Broderick and Henderson Const	Mr. Gary Broderick	(801) 225-9213	(801) 225-4697
Cal Wadsworth Construction	Mr. Cal Wadsworth	(801) 208-1957	(801) 208-1975
Chad Husband Construction, Inc	Mr. Richard Marshall	(801) 972-1146	(801) 886-1784
Control Inc.	Mr. Ralph B. Burk	(801) 561-2263	(801) 561-2305
Darrell Anderson Construction	Mr. James Anderson	(435) 752-6860	(435) 752-7606
Garff Construction	Mr. Phil Henriksen	(801) 973-4248	(801) 972-1928
Gramoll Construction	Mr. Ken Romney	(801) 295-2341	(801) 295-2356
Jepson Construction	Mr. Rick Jepson	(801) 774-8860	(801) 773-8980
Keller Construction	Mr. S. Daniel Hill	(801) 972-1018	(801) 972-1063
McCullough Engineering	Mr. Jim McCullough	(801) 466-4949	(801) 466-4989
Saunders Construction	Mr. Edward Saunders	(801) 782-7830	(801) 782-7856
Valley Design and Construction	Mr. Corey King	(801) 927-9542	(801) 927-9544
Wade Payne Construction, Inc.	Mr. Wade Payne	(801) 226-6144	(801) 226-7772

The bid documents will be available at noon on Monday, May 22, 2006 in electronic format from DFCM at 4110 State Office Building, Salt Lake City, Utah 84114, telephone (801)538-3018 and on the DFCM web page at <http://dfcm.utah.gov>. For questions regarding this project, please contact Wayne Smith, Project Manager, DFCM, at (801)550-6536. No others are to be contacted regarding this project.

A **MANDATORY** pre-bid meeting and site visit will be held at 11:00 AM on Tuesday, May 23, 2006 at Draper National Guard, 12593 South Minuteman Way, Draper, Utah. All short listed prime contractors wishing to bid on this project must attend this meeting.

Bids must be submitted by 3:00 PM on Tuesday, May 30, 2006 to DFCM, 4110 State Office Building, Salt Lake City, Utah 84114. Bids will be opened and read aloud in the DFCM Conference Room, 4110 State Office Building, Salt Lake City, Utah. Note: Bids must be received at 4110 State Office Building by the specified time. The contractor shall comply with and require all of its subcontractors to comply with the license laws as required by the State of Utah. A bid bond in the amount of five percent (5%) of the bid amount, made payable to the Division of Facilities Construction and Management on DFCM's bid bond form, shall accompany the bid. The Division of Facilities Construction & Management reserves the right to reject any or all bids or to waive any formality or technicality in any bid in the interest of the State.

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT  
MARLA WORKMAN, CONTRACT COORDINATOR  
4110 State Office Bldg., Salt Lake City, Utah 84114

## **STAGE II BIDDING PROCESS**

### **ONLY CONTRACTORS PREVIOUSLY SHORT-LISTED DURING STAGE I ARE ALLOWED TO BID ON THIS PROJECT**

#### **1. Invitational Bid Procedures**

Invitation to Bid: DFCM will notify each short-listed firm via e-mail and/or fax when a project is ready for construction services.

Bid Documents: Bidding documents including plans and specifications (if applicable) may be obtained by accessing DFCM's web page at <http://dfcm.utah.gov> or at DFCM's office 4110 State Office Building, Salt Lake City, Utah 84114.

Mandatory Pre-Bid Site Meeting: If required, the schedule contained in this document will indicate the date, time, and place of the mandatory pre-bid site meeting. At this meeting, contractors will receive additional instructions about the project and have an opportunity to ask questions about project details. If a firm fails to attend a pre-bid site meeting labeled "Mandatory" they will not be allowed to bid on the project.

Written Questions: The schedule contained in this document will indicate the deadline for submitting questions in writing to the DFCM Representative pertaining to this project.

Final Addendum: The schedule contained in this document will indicate the deadline for DFCM issuing the final addendum clarifying questions and changes to the scope of work. Contractors are responsible for obtaining and responding to information contained in the addenda.

Submitting Bids: Bids must be submitted to DFCM, 4110 State Office Building, Salt Lake City, Utah 84114 by the deadline indicated on the schedule contained in this document. Bids submitted after the deadline will not be accepted. Bids will be opened at DFCM on the date, time, and place indicated on the schedule. (Additional information pertaining to bidding is contained later in this document). It is your responsibility to allow for the time needed to park on Capitol Hill as recent construction activity has made the parking more difficult. Identification is required to enter the building.

Subcontractors List: The firm selected for the project must submit a list of all subcontractors by the deadline indicated on the schedule contained in this document. (Additional information pertaining to subcontractor lists is contained later in this document)

#### **2. Drawings and Specifications, Other Contract Documents**

Drawings and Specifications, as well as other available Contract Documents, may be obtained as stated in the Notice to Contractors.

3. **Bids**

Before submitting a bid, each bidder shall carefully examine the Contract Documents; shall visit the site of the Work; shall fully inform themselves as to all existing conditions and limitations; and shall include in the bid the cost of all items required by the Contract Documents. If the bidder observes that portions of the Contract Documents are at variance with applicable laws, building codes, rules, regulations or contain obvious erroneous or uncoordinated information, the bidder shall promptly notify the DFCM Representative and the necessary changes shall be accomplished by Addendum.

The bid, bearing original signatures, must be typed or handwritten in ink on the Bid Form provided in the procurement documents and submitted in a sealed envelope at the location specified by the Notice to Contractor's prior to the published deadline for the submission of bids.

Bid bond security, in the amount of five percent (5%) of the bid, made payable to the Division of Facilities Construction and Management, shall accompany bid. **THE BID BOND MUST BE ON THE BID BOND FORM PROVIDED IN THE PROCUREMENT DOCUMENTS IN ORDER TO BE CONSIDERED AN ACCEPTABLE BID.**

If the bid bond security is submitted on a bid bond form other than the DFCM's required bid bond form, and the bid security meets all other legal requirements, the bidder will be allowed to provide an acceptable bid bond by the close of business on the next business day following notification by DFCM of submission of a defective bid bond security. **Note: A cashier's check cannot be used as a substitute for a bid bond.**

4. **Contract and Bond**

The Contractor's Agreement will be in the form bound in the specifications. The Contract Time will be as indicated in the bid. The successful bidder, simultaneously with the execution of the Contract Agreement, will be required to furnish a performance bond and a payment bond, both bearing original signatures, upon the forms provided in the procurement documents. The performance and payment bonds shall be for an amount equal to one hundred percent (100%) of the Contract Sum and secured from a company that meets the requirements specified in the requisite forms. Any bonding requirements for Subcontractors will be specified in the Supplementary General Conditions.

5. **Listing of Subcontractors**

Listing of Subcontractors shall be as summarized in the “Instructions and Subcontractor’s List Form”, which are included as part of these Contract Documents. The subcontractors list shall be delivered to DFCM or faxed to DFCM at (801)538-3677 within 24 hours of the bid opening. Requirements for listing additional subcontractors will be listed in the Contract Documents.

DFCM retains the right to audit or take other steps necessary to confirm compliance with requirements for the listing and changing of subcontractors. Any contractor who is found to not be in compliance with these requirements is subject to a debarment hearing and may be debarred from consideration for award of contract for a period of up to three years.

6. **Interpretation of Drawings and Specifications**

If any person or entity contemplating submitting a bid is in doubt as to the meaning of any part of the drawings, specifications or other Contract Documents, such person shall submit to the DFCM Representative a request for an interpretation thereof. The person or entity submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by Addenda duly issued and a copy of such Addenda will be mailed or delivered to each person or entity receiving a set of documents. Neither DFCM nor A/E will be responsible for any other explanations or interpretations of the proposed documents. A/E shall be deemed to refer to the architect or engineer hired by DFCM as the A/E or Consultant for the Project.

7. **Addenda**

Any Addenda issued during the time of bidding shall become part of the Contract Documents made available to the bidders for the preparation of the bid, shall be covered in the bid, and shall be made a part of the Contract.

8. **Award of Contract**

The Contract will be awarded as soon as possible to the lowest, responsive and responsible bidder, based on the lowest combination of base bid and acceptable prioritized alternates, provided the bid is reasonable, is in the interests of the State of Utah to accept and after applying the Utah Preference Laws in U.C.A. Title 63, Chapter 56. The DFCM reserves the right to waive any technicalities or formalities in any bid or in the bidding. Alternates will be accepted on a prioritized basis with Alternate 1 being highest priority, Alternate 2 having second priority, etc.

9. **DFCM Contractor Performance Rating**

DFCM will evaluate the performance of the Contractor. This evaluation may include comments from the User. The Contractor will have an opportunity to review and comment on the evaluation. Evaluations, including the Contractor's comments, may be considered in future selection in the evaluation of the Contractor's past performance.

10. **Licensure**

The Contractor shall comply with and require all of its Subcontractors to comply with the license laws as required by the State of Utah.

11. **Right to Reject Bids**

DFCM reserves the right to reject any or all Bids.

12. **Time is of the Essence**

The completion deadline for this project is June 30, 2006. Failure to meet the completion deadline may result in a poor performance rating from DFCM which may have a negative impact on your firm's ability to obtain future work with the state of Utah and may also result in liquidated damages being assessed. Time is of the essence in regard to all the requirements of the Contract Documents.

13. **Withdrawal of Bids**

Bids may be withdrawn on written request received from bidders within 24 hours after the bid opening if the contractor has made an error in preparing the bid.

14. **Product Approvals**

Where reference is made to one or more proprietary products in the Contract Documents, but restrictive descriptive materials of one or more manufacturer(s) is referred to in the Contract Documents, the products of other manufacturers will be accepted, provided they equal or exceed

the standards set forth in the drawings and specifications and are compatible with the intent and purpose of the design, subject to the written approval of the A/E. Such written approval must occur prior to the deadline established for the last scheduled addenda to be issued. The A/E's written approval will be in an issued Addendum. If the descriptive material is not restrictive, the products of other manufacturers specified will be accepted without prior approval provided they are compatible with the intent and purpose of the design as determined by the A/E.

15. **Financial Responsibility of Contractors, Subcontractors and Sub-subcontractors**

Contractors shall respond promptly to any inquiry in writing by the DFCM to any concern of financial responsibility of the Contractor, Subcontractor or Sub-subcontractor.

16. **Debarment.**

By submitting a bid, the Contractor certifies that neither it nor its principals, including project and site managers, have been, or are under consideration for, debarment or suspension, or any action that would exclude such from participation in a construction contract by any governmental department or agency. If the Contractor cannot certify this statement, attach to the bid a detailed written explanation which must be reviewed and approved by the DFCM as part of the requirements for award of the Project.





STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

**Division of Facilities Construction and Management**

**DFCM**

**PROJECT SCHEDULE**  
**Stage II = Two-Stage Bidding Process**

**PROJECT NAME: JOINT OPERATIONS CENTER REMODEL - DRAPER HEADQUARTERS**  
**UTAH NATIONAL GUARD – DRAPER, UTAH**  
**DFCM PROJECT # 06036480**

Event	Day	Date	Time	Place
Stage II Bidding Documents Available	Monday	May 22, 2006	12:00 NOON	DFCM, 4110 State Office Bldg, SLC, UT and DFCM web site *
<b>Mandatory</b> Pre-bid Site Meeting	Tuesday	May 23, 2006	11:00 AM	Draper National Guard 12593 So Minuteman Way Salt Lake City, UT
Last Day to Submit Questions	Thursday	May 25, 2006	4:00 PM	DFCM, 4110 State Office Bldg, SLC, UT
Final Addendum Issued	Friday	May 26, 2006	4:00 PM	DFCM, 4110 State Office Bldg, SLC, UT or DFCM web site*
Prime Contractors Turn in Bid and Bid Bond / Bid Opening in DFCM Conference Room	Tuesday	May 30, 2006	3:00 PM	DFCM, 4110 State Office Bldg, SLC, UT
Subcontractors List Due	Wednesday	May 31, 2006	3:00 PM	DFCM, 4110 State Office Bldg, SLC, UT
Project Completion Date	Friday	June 30, 2006		

\* DFCM's web site address is <http://dfcm.utah.gov>



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

**Division of Facilities Construction and Management**

**DFCM**

**BID FORM**

NAME OF BIDDER \_\_\_\_\_ DATE \_\_\_\_\_

To the Division of Facilities Construction and Management  
4110 State Office Building  
Salt Lake City, Utah 84114

The undersigned, responsive to the "Notice to Contractors" and in accordance with the Request for Bids for the **JOINT OPERATIONS CENTER REMODEL – DRAPER HEADQUARTERS - UTAH NATIONAL GUARD – DRAPER, UTAH - DFCM PROJECT NO: 06036480** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: \_\_\_\_\_

For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

\_\_\_\_\_ DOLLARS (\$\_\_\_\_\_) (In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete no later than **June 30, 2006**, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **\$150.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

This bid shall be good for 45 days after bid opening.

Enclosed is a 5% bid bond, as required, in the sum of \_\_\_\_\_

The undersigned Contractor's License Number for Utah is \_\_\_\_\_.

BID FORM  
PAGE NO. 2

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract. The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable 100% Performance and Payment bonds are not delivered within time set forth.

Type of Organization:

\_\_\_\_\_  
(Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:

\_\_\_\_\_

Respectfully submitted,

\_\_\_\_\_  
Name of Bidder

ADDRESS:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Authorized Signature

## BID BOND

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

### KNOW ALL PERSONS BY THESE PRESENTS:

That \_\_\_\_\_ hereinafter referred to as the "Principal," and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, with its principal office in the City of \_\_\_\_\_ and authorized to transact business in this State and U. S. Department of the Treasury Listed, (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the STATE OF UTAH, hereinafter referred to as the "Obligee," in the amount of \$ \_\_\_\_\_ (5% of the accompanying bid), being the sum of this Bond to which payment the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

**THE CONDITION OF THIS OBLIGATION IS SUCH** that whereas the Principal has submitted to Obligee the accompanying bid incorporated by reference herein, dated as shown, to enter into a contract in writing for the \_\_\_\_\_ Project.

**NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH**, that if the said principal does not execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the principal, then the sum of the amount stated above will be forfeited to the State of Utah as liquidated damages and not as a penalty; if the said principal shall execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the Principal, then this obligation shall be null and void. It is expressly understood and agreed that the liability of the Surety for any and all defaults of the Principal hereunder shall be the full penal sum of this Bond. The Surety, for value received, hereby stipulates and agrees that obligations of the Surety under this Bond shall be for a term of sixty (60) days from actual date of the bid opening.

**PROVIDED, HOWEVER**, that this Bond is executed pursuant to provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to same extent as if it were copied at length herein.

**IN WITNESS WHEREOF**, the above bounden parties have executed this instrument under their several seals on the date indicated below, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

**DATED** this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

**Principal's name and address (if other than a corporation):**

\_\_\_\_\_  
\_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

**Principal's name and address (if a corporation):**

\_\_\_\_\_  
\_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Affix Corporate Seal)

**Surety's name and address:**

\_\_\_\_\_  
\_\_\_\_\_

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) ss.

By: \_\_\_\_\_  
Attorney-in-Fact (Affix Corporate Seal)

On this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_, personally appeared before me \_\_\_\_\_, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

My Commission Expires: \_\_\_\_\_

Resides at: \_\_\_\_\_

Agency: \_\_\_\_\_  
Agent: \_\_\_\_\_  
Address: \_\_\_\_\_  
Phone: \_\_\_\_\_

NOTARY PUBLIC

Approved As To Form: May 25, 2005  
By Alan S. Bachman, Asst Attorney General

**Division of Facilities Construction and Management****INSTRUCTION AND SUBCONTRACTORS LIST FORM**

The three low bidders, as well as all other bidders that desire to be considered, are required by law to submit to DFCM within 24 hours of bid opening a list of **ALL** first-tier subcontractors, including the subcontractor's name, bid amount and other information required by Building Board Rule and as stated in these Contract Documents, on the following basis:

**PROJECTS UNDER \$500,000 - ALL SUBS \$20,000 OR OVER MUST BE LISTED**  
**PROJECTS \$500,000 OR MORE - ALL SUBS \$35,000 OR OVER MUST BE LISTED**

- Any additional subcontractors identified in the bid documents shall also be listed.
- The DFCM Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law.
- List subcontractors for base bid as well as the impact on the list that the selection of any alternate may have.
- Bidder may not list more than one subcontractor to perform the same work.
- Bidder must list "Self" if performing work itself.

**LICENSURE:**

The subcontractor's name, the type of work, the subcontractor's bid amount, and the subcontractor's license number as issued by DOPL, if such license is required under Utah Law, shall be listed. Bidder shall certify that all subcontractors, required to be licensed, are licensed as required by State law. A subcontractor includes a trade contractor or specialty contractor and does not include suppliers who provide only materials, equipment, or supplies to a contractor or subcontractor.

**BIDDER LISTING 'SELF' AS PERFORMING THE WORK:**

Any bidder that is properly licensed for the particular work and intends to perform that work itself in lieu of a subcontractor that would otherwise be required to be on the subcontractor list, must insert the term 'Self' for that category on the subcontractor list form. Any listing of 'Self' on the sublist form shall also include the amount allocated for that work.

**'SPECIAL EXCEPTION':**

A bidder may list 'Special Exception' in place of a subcontractor when the bidder intends to obtain a subcontractor to perform the work at a later date because the bidder was unable to obtain a qualified or reasonable bid under the provisions of U.C.A. Section 63A-5-208(4). The bidder shall insert the term 'Special Exception' for that category of work, and shall provide documentation with the subcontractor list describing the bidder's efforts to obtain a bid of a qualified subcontractor at a reasonable cost and why the bidder was unable to obtain a qualified subcontractor bid. The Director must find that the bidder complied in good faith with State law requirements for any 'Special Exception' designation, in order for the bid to be considered. If awarded the contract, the Director shall supervise the bidder's efforts to obtain a qualified subcontractor bid. The amount of the awarded contract may not be adjusted to reflect the actual amount of the subcontractor's bid. Any listing of 'Special Exception' on the sublist form shall also include amount allocated for that work.

**INSTRUCTIONS AND SUBCONTRACTORS LIST FORM**  
**Page No. 2**

**GROUND FOR DISQUALIFICATION:**

The Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law. Director may withhold awarding the contract to a particular bidder if one or more of the proposed subcontractors are considered by the Director to be unqualified to do the Work or for such other reason in the best interest of the State of Utah. Notwithstanding any other provision in these instructions, if there is a good faith error on the sublist form, at the sole discretion of the Director, the Director may provide notice to the contractor and the contractor shall have 24 hours to submit the correction to the Director. If such correction is submitted timely, then the sublist requirements shall be considered met.

**CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:**

Subsequent to twenty-four hours after the bid opening, the contractor may change its listed subcontractors only after receiving written permission from the Director based on complying with all of the following criteria.

- (1) The contractor has established in writing that the change is in the best interest of the State and that the contractor establishes an appropriate reason for the change, which may include, but not is not limited to, the following reasons: the original subcontractor has failed to perform, or is not qualified or capable of performing, and/or the subcontractor has requested in writing to be released.
- (2) The circumstances related to the request for the change do not indicate any bad faith in the original listing of the subcontractors.
- (3) Any requirement set forth by the Director to ensure that the process used to select a new subcontractor does not give rise to bid shopping.
- (4) Any increase in the cost of the subject subcontractor work is borne by the contractor.
- (5) Any decrease in the cost of the subject subcontractor work shall result in a deductive change order being issued for the contract for such decreased amount.
- (6) The Director will give substantial weight to whether the subcontractor has consented in writing to being removed unless the Contractor establishes that the subcontractor is not qualified for the work.

**EXAMPLE:**

Example of a list where there are only four subcontractors:

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONT. LICENSE #
ELECTRICAL	ABCD Electric Inc.	\$350,000.00	123456789000
LANDSCAPING	"Self"	300,000.00	123456789000
CONCRETE (ALTERNATE #1)	XYZ Concrete Inc	298,000.00	987654321000
MECHANICAL	"Special Exception" (attach documentation)	Fixed at: 350,000.00	(TO BE PROVIDED AFTER OBTAINING SUBCONTRACTOR)

**PURSUANT TO STATE LAW - SUBCONTRACTOR BID AMOUNTS CONTAINED IN THIS  
SUBCONTRACTOR LIST SHALL NOT BE DISCLOSED UNTIL THE CONTRACT HAS BEEN AWARDED.**

**Division of Facilities Construction and Management****SUBCONTRACTORS LIST  
FAX TO 801-538-3677****PROJECT TITLE:** \_\_\_\_\_**Caution:** You must read and comply fully with instructions.

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONT. LICENSE #

We certify that:

1. This list includes all subcontractors as required by the instructions, including those related to the base bid as well as any alternates.
2. We have listed "Self" or "Special Exception" in accordance with the instructions.
3. All subcontractors are appropriately licensed as required by State law.

FIRM: \_\_\_\_\_

DATE: \_\_\_\_\_

SIGNED BY: \_\_\_\_\_

**NOTICE:** FAILURE TO SUBMIT THIS FORM, PROPERLY COMPLETED AND SIGNED, AS REQUIRED IN THESE CONTRACT DOCUMENTS, SHALL BE GROUNDS FOR DFCMS REFUSAL TO ENTER INTO A WRITTEN CONTRACT WITH BIDDER. ACTION MAY BE TAKEN AGAINST BIDDERS BID BOND AS DEEMED APPROPRIATE BY DFCM. ATTACH A SECOND PAGE IF NECESSARY.

# **FUGITIVE DUST PLAN**

The Contractor will fill out the form and file the original with the Division of Air Quality and a copy of the form with the Division of Facilities Construction & Management, prior to the issuance of any notice to proceed.

The Contractor will be fully responsible for compliance with the Fugitive Dust Control Plan, including the adequacy of the plan, any damages, fines, liability, and penalty or other action that results from noncompliance.



**Utah Division of Air Quality**

*April 20, 1999*

**GUIDANCE THAT MUST BE CONSIDERED IN DEVELOPING AND SUBMITTING A  
DUST CONTROL PLAN FOR COMPLIANCE WITH R307-309-3, 4, 5, 6, 7**

Source Information:

1. Name of your operation (source): provide a name if the source is a construction site.
2. Address or location of your operation or construction site.
3. UTM coordinates or Longitude/Latitude of stationary emission points at your operation.
4. Lengths of the project, if temporary (time period).
5. Description of process (include all sources of dust and fugitive dust). Please, if necessary, use additional sheets of paper for this description. Be sure to mark it as an attachment.
6. Type of material processed or disturbed.
7. Amount of material processed (tons per year, tons per month, lbs./hr., and applicable units).

8. Destination of product (where will the material produced be used or transported, be specific, provide address or specific location), information needed for temporary relocation applicants.
9. Identify the individual who is responsible for the implementation and maintenance of fugitive dust control measures. List name(s), position(s) and telephone number(s).
10. List, and attach copies of any contract lease, liability agreement with other companies that may, or will, be responsible for dust control on site or on the project.

**Description of Fugitive Dust Emission Activities**  
**(Things to consider in addressing fugitive dust control strategies.)**

1. Type of activities (drilling and blasting, road construction, development construction, earth moving and excavation, handling and hauling materials, cleaning and leveling, etc).
2. List type of equipment generating the fugitive dust.
3. Diagram the location of each activity or piece of equipment on site. Please attach the diagram.
4. Provide pictures or drawings of each activity. Include a drawing of the unpaved/paved road network used to move loads “on” and “off” property.
5. Vehicle miles travels on unpaved roads associated with the activity (average speed).
6. Type of dust emitted at each source (coal, cement, sand, soil, clay, dust, etc.)
7. Estimate the size of the release area at which the activity occurs (square miles). For haul or dirt roads include total miles of road in use during the activity.

## **Description of Fugitive Dust Emission Controls on Site**

Control strategies must be designed to meet 20% opacity or less on site (a lesser opacity may be defined by Approval Order conditions or federal requirements such as NSPS), and control strategies must prevent exceeding 10% opacity from fugitive dust at the property boundary (site boundary) for compliance with R307-309-3.

1. Types of ongoing emission controls proposed for each activity, each piece of equipment, and haul roads.
2. Types of additional dust controls proposed for bare, exposed surfaces (chemical stabilization, synthetic cover, wind breaks, vegetative cover, etc).
3. Method of application of dust suppressant.
4. Frequency of application of dust suppressant.
5. Explain what triggers the use of a special control measure other than routine measures already in place, such as covered loads or measures covered by a permit condition (increase in opacity, high winds, citizen complaints, dry conditions, etc).
6. Explain in detail what control strategies/measures will be implemented off-hours, i.e., Saturdays/Sundays/Holidays, as well as 6 PM to 6 AM each day.

## **Description of Fugitive Dust Control Off-site**

Prevent, to the maximum extent possible, deposition of materials, which may create fugitive dust on public and private paved roads in compliance with R307-309-5, 6, 7.

1. Types of emission controls initiated by your operation that are in place “off” property (application of water, covered loads, sweeping roads, vehicle cleaning, etc.).
  
2. Proposed remedial controls that will be initiated promptly if materials, which may create fugitive dust, are deposited on public and private paved roads.

Submit the Dust Control Plan to:

Executive Secretary  
Utah Air Quality Board  
POB 144820  
15 North 1950 West  
Salt Lake City, Utah 84114-4820

Phone: (801) 536-4000  
FAX: (801) 536-4099

## **Fugitive Dust Control Plan Violation Report**

When a source is found in violation of R307-309-3 or in violation of the Fugitive Dust Control Plan, the source must submit a report to the Executive Secretary within 15 days after receiving a Notice of Violation. The report must include the following information:

1. Name and address of dust source.
2. Time and duration of dust episode.
3. Meteorological conditions during the dust episode.
4. Total number and type of fugitive dust activities and dust producing equipment within each operation boundary. If no change has occurred from the existing dust control plan, the source should state that the activity/equipment is the same.
5. Fugitive dust activities or dust producing equipment that caused a violation of R-307-309-3 or the source's dust control plan.
6. Reasons for failing to control dust from the dust generating activity or equipment.
7. New and/or additional fugitive dust control strategies necessary to achieve compliance with R307-309-3, 4, 5, 6, or 7.
8. If it can not be demonstrated that the current approved Dust Control Plan can result in compliance with R307-309-3 through 7, the Dust Control Plan must be revised so as to demonstrate compliance with 307-309-3 through 7. Within 30 days of receiving a fugitive dust Notice of Violation, the source must submit the revised Plan to the Executive Secretary for review and approval.

Submit the Dust Control Plan to:

Executive Secretary	Phone: (801) 536-4000
Utah Air Quality Board	FAX: (801) 536-4099
POB 144820	
15 North 1950 West	
Salt Lake City, Utah 84114-4820	

Attachments: DFCM Form FDR R-307-309, Rule 307-309

## CONTRACTOR'S AGREEMENT

FOR:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

THIS CONTRACTOR'S AGREEMENT, made and entered into this \_\_\_\_ day of \_\_\_\_\_, 20\_\_, by and between the DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT, hereinafter referred to as "DFCM", and \_\_\_\_\_, incorporated in the State of \_\_\_\_\_ and authorized to do business in the State of Utah, hereinafter referred to as "Contractor", whose address is \_\_\_\_\_.

WITNESSETH: WHEREAS, DFCM intends to have Work performed at \_\_\_\_\_  
\_\_\_\_\_.

WHEREAS, Contractor agrees to perform the Work for the sum stated herein.

NOW, THEREFORE, DFCM and Contractor for the consideration provided in this Contractor's Agreement, agree as follows:

**ARTICLE 1. SCOPE OF WORK.** The Work to be performed shall be in accordance with the Contract Documents prepared by \_\_\_\_\_ and entitled "\_\_\_\_\_  
\_\_\_\_\_."

The DFCM General Conditions ("General Conditions") dated May 25, 2005 on file at the office of DFCM and available on the DFCM website, are hereby incorporated by reference as part of this Agreement and are included in the specifications for this Project. All terms used in this Contractor's Agreement shall be as defined in the Contract Documents, and in particular, the General Conditions.

The Contractor Agrees to furnish labor, materials and equipment to complete the Work as required in the Contract Documents which are hereby incorporated by reference. It is understood and agreed by the parties hereto that all Work shall be performed as required in the Contract Documents and shall be subject to inspection and approval of DFCM or its authorized representative. The relationship of the Contractor to the DFCM hereunder is that of an independent Contractor.

**ARTICLE 2. CONTRACT SUM.** The DFCM agrees to pay and the Contractor agrees to accept in full performance of this Contractor's Agreement, the sum of \_\_\_\_\_ DOLLARS AND NO CENTS (\$\_\_\_\_\_.00), which is the base bid, and which sum also includes the cost of a 100%

CONTRACTOR'S AGREEMENT  
PAGE NO. 2

Performance Bond and a 100% Payment Bond as well as all insurance requirements of the Contractor. Said bonds have already been posted by the Contractor pursuant to State law. The required proof of insurance certificates have been delivered to DFCM in accordance with the General Conditions before the execution of this Contractor's Agreement.

**ARTICLE 3. TIME OF COMPLETION AND DELAY REMEDY.** The Work shall be Substantially Complete within \_\_\_\_\_ (\_\_\_\_) calendar days after the date of the Notice to Proceed. Contractor agrees to pay liquidated damages in the amount of \$\_\_\_\_\_ per day for each day after expiration of the Contract Time until the Contractor achieves Substantial Completion in accordance with the Contract Documents, if Contractor's delay makes the damages applicable. The provision for liquidated damages is: (a) to compensate the DFCM for delay only; (b) is provided for herein because actual damages can not be readily ascertained at the time of execution of this Contractor's Agreement; (c) is not a penalty; and (d) shall not prevent the DFCM from maintaining Claims for other non-delay damages, such as costs to complete or remedy defective Work.

No action shall be maintained by the Contractor, including its or Subcontractor or suppliers at any tier, against the DFCM or State of Utah for damages or other claims due to losses attributable to hindrances or delays from any cause whatsoever, including acts and omissions of the DFCM or its officers, employees or agents, except as expressly provided in the General Conditions. The Contractor may receive a written extension of time, signed by the DFCM, in which to complete the Work under this Contractor's Agreement in accordance with the General Conditions.

**ARTICLE 4. CONTRACT DOCUMENTS.** The Contract Documents consist of this Contractor's Agreement, the Conditions of the Contract (DFCM General Conditions, Supplementary and other Conditions), the Drawings, Specifications, Addenda and Modifications. The Contract Documents shall also include the bidding documents, including the Notice to Contractors, Instructions to Bidders/Proposers and the Bid/Proposal, to the extent not in conflict therewith and other documents and oral presentations that are documented as an attachment to the contract.

All such documents are hereby incorporated by reference herein. Any reference in this Contractor's Agreement to certain provisions of the Contract Documents shall in no way be construed as to lessen the importance or applicability of any other provisions of the Contract Documents.

**ARTICLE 5. PAYMENT.** The DFCM agrees to pay the Contractor from time to time as the Work progresses, but not more than once each month after the date of Notice to Proceed, and only upon Certificate of the A/E for Work performed during the preceding calendar month, ninety-five percent (95%) of the value of the labor performed and ninety-five percent (95%) of the value of materials furnished in place or on the site. The Contractor agrees to furnish to the DFCM invoices for materials purchased and on the site but not installed, for which the



CONTRACTOR'S AGREEMENT  
PAGE NO. 3

Contractor requests payment and agrees to safeguard and protect such equipment or materials and is responsible for safekeeping thereof and if such be stolen, lost or destroyed, to replace same.

Such evidence of labor performed and materials furnished as the DFCM may reasonably require shall be supplied by the Contractor at the time of request for Certificate of Payment on account. Materials for which payment has been made cannot be removed from the job site without DFCM's written approval. Five percent (5%) of the earned amount shall be retained from each monthly payment. The retainage, including any additional retainage imposed and the release of any retainage, shall be in accordance with UCA 13-8-5 as amended. Contractor shall also comply with the requirements of UCA 13-8-5, including restrictions of retainage regarding subcontractors and the distribution of interest earned on the retention proceeds. The DFCM shall not be responsible for enforcing the Contractor's obligations under State law in fulfilling the retention law requirements with subcontractors at any tier.

**ARTICLE 6. INDEBTEDNESS.** Before final payment is made, the Contractor must submit evidence satisfactory to the DFCM that all payrolls, materials bills, subcontracts at any tier and outstanding indebtedness in connection with the Work have been properly paid. Final Payment will be made after receipt of said evidence, final acceptance of the Work by the DFCM as well as compliance with the applicable provisions of the General Conditions.

Contractor shall respond immediately to any inquiry in writing by DFCM as to any concern of financial responsibility and DFCM reserves the right to request any waivers, releases or bonds from Contractor in regard to any rights of Subcontractors (including suppliers) at any tier or any third parties prior to any payment by DFCM to Contractor.

**ARTICLE 7. ADDITIONAL WORK.** It is understood and agreed by the parties hereto that no money will be paid to the Contractor for additional labor or materials furnished unless a new contract in writing or a Modification hereof in accordance with the General Conditions and the Contract Documents for such additional labor or materials has been executed. The DFCM specifically reserves the right to modify or amend this Contractor's Agreement and the total sum due hereunder either by enlarging or restricting the scope of the Work.

**ARTICLE 8. INSPECTIONS.** The Work shall be inspected for acceptance in accordance with the General Conditions.

**ARTICLE 9. DISPUTES.** Any dispute, PRE or Claim between the parties shall be subject to the provisions of Article 7 of the General Conditions. DFCM reserves all rights to pursue its rights and remedies as provided in the General Conditions.

**ARTICLE 10. TERMINATION, SUSPENSION OR ABANDONMENT.** This Contractor's Agreement may be terminated, suspended or abandoned in accordance with the General Conditions.

**ARTICLE 11. DFCM'S RIGHT TO WITHHOLD CERTAIN AMOUNT AND MAKE USE THEREOF.** The DFCM may withhold from payment to the Contractor such amount as, in DFCM's judgment, may be necessary to pay just claims against the Contractor or Subcontractor at any tier for labor and services rendered and materials furnished in and about the Work. The DFCM may apply such withheld amounts for the payment of such claims in DFCM's discretion. In so doing, the DFCM shall be deemed the agent of Contractor and payment so made by the DFCM shall be considered as payment made under this Contractor's Agreement by the DFCM to the Contractor. DFCM shall not be liable to the Contractor for any such payment made in good faith. Such withholdings and payments may be made without prior approval of the Contractor and may be also be prior to any determination as a result of any dispute, PRE, Claim or litigation.

**ARTICLE 12. INDEMNIFICATION.** The Contractor shall comply with the indemnification provisions of the General Conditions.

**ARTICLE 13. SUCCESSORS AND ASSIGNMENT OF CONTRACT.** The DFCM and Contractor, respectively bind themselves, their partners, successors, assigns and legal representatives to the other party to this Agreement, and to partners, successors, assigns and legal representatives of such other party with respect to all covenants, provisions, rights and responsibilities of this Contractor's Agreement. The Contractor shall not assign this Contractor's Agreement without the prior written consent of the DFCM, nor shall the Contractor assign any moneys due or to become due as well as any rights under this Contractor's Agreement, without prior written consent of the DFCM.

**ARTICLE 14. RELATIONSHIP OF THE PARTIES.** The Contractor accepts the relationship of trust and confidence established by this Contractor's Agreement and covenants with the DFCM to cooperate with the DFCM and A/E and use the Contractor's best skill, efforts and judgment in furthering the interest of the DFCM; to furnish efficient business administration and supervision; to make best efforts to furnish at all times an adequate supply of workers and materials; and to perform the Work in the best and most expeditious and economic manner consistent with the interests of the DFCM.

**ARTICLE 15. AUTHORITY TO EXECUTE AND PERFORM AGREEMENT.** Contractor and DFCM each represent that the execution of this Contractor's Agreement and the performance thereunder is within their respective duly authorized powers.

**ARTICLE 16. ATTORNEY FEES AND COSTS.** Except as otherwise provided in the dispute resolution provisions of the General Conditions, the prevailing party shall be entitled to reasonable attorney fees and costs incurred in any action in the District Court and/or appellate body to enforce this Contractor's Agreement or recover damages or any other action as a result of a breach thereof.

CONTRACTOR'S AGREEMENT  
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**IN WITNESS WHEREOF**, the parties hereto have executed this Contractor's Agreement on the day and year stated hereinabove.

**CONTRACTOR:** \_\_\_\_\_

\_\_\_\_\_  
Signature Date

Title: \_\_\_\_\_

State of \_\_\_\_\_ )  
County of \_\_\_\_\_ )

\_\_\_\_\_  
Please type/print name clearly

On this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, personally appeared before me, \_\_\_\_\_, whose identity is personally known to me (or proved to me on the basis of satisfactory evidence) and who by me duly sworn (or affirmed), did say that he (she) is the \_\_\_\_\_ (title or office) of the firm and that said document was signed by him (her) in behalf of said firm.

(SEAL)

\_\_\_\_\_  
**Notary Public**

My Commission Expires \_\_\_\_\_

APPROVED AS TO AVAILABILITY  
OF FUNDS:

\_\_\_\_\_  
Financial Manager, Date  
Division of Facilities Construction  
and Management

**DIVISION OF FACILITIES  
CONSTRUCTION AND MANAGEMENT**

\_\_\_\_\_  
Manager - Date  
Capital \_\_\_\_\_

APPROVED AS TO FORM:  
ATTORNEY GENERAL  
May 25, 2005  
By: Alan S. Bachman  
Asst Attorney General

APPROVED FOR EXPENDITURE:  
\_\_\_\_\_  
Division of Finance Date

**PERFORMANCE BOND**  
(Title 63, Chapter 56, U. C. A. 1953, as Amended)

That \_\_\_\_\_ hereinafter referred to as the "Principal" and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, with its principal office in the City of \_\_\_\_\_ and authorized to transact business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah, hereinafter referred to as the "Obligee," in the amount of \_\_\_\_\_ DOLLARS (\$ \_\_\_\_\_) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

**WHEREAS**, the Principal has entered into a certain written Contract with the Obligee, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, to construct \_\_\_\_\_ in the County of \_\_\_\_\_, State of Utah, Project No. \_\_\_\_\_, for the approximate sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), which Contract is hereby incorporated by reference herein.

**NOW, THEREFORE**, the condition of this obligation is such that if the said Principal shall faithfully perform the Contract in accordance with the Contract Documents including, but not limited to, the Plans, Specifications and conditions thereof, the one year performance warranty, and the terms of the Contract as said Contract may be subject to Modifications or changes, then this obligation shall be void; otherwise it shall remain in full force and effect.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the state named herein or the heirs, executors, administrators or successors of the Owner.

The parties agree that the dispute provisions provided in the Contract Documents apply and shall constitute the sole dispute procedures of the parties.

**PROVIDED, HOWEVER**, that this Bond is executed pursuant to the Provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

**IN WITNESS WHEREOF**, the said Principal and Surety have signed and sealed this instrument this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

**WITNESS OR ATTESTATION:**

**PRINCIPAL:**

\_\_\_\_\_

\_\_\_\_\_

By: \_\_\_\_\_

(Seal)

Title: \_\_\_\_\_

**WITNESS OR ATTESTATION:**

**SURETY:**

\_\_\_\_\_

\_\_\_\_\_

By: \_\_\_\_\_

Attorney-in-Fact (Seal)

STATE OF \_\_\_\_\_ )  
 ) ss.  
COUNTY OF \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, personally appeared before me \_\_\_\_\_, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney in-fact of the above-named Surety Company and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

My commission expires: \_\_\_\_\_

Resides at: \_\_\_\_\_

\_\_\_\_\_  
NOTARY PUBLIC

**Agency:** \_\_\_\_\_  
**Agent:** \_\_\_\_\_  
**Address:** \_\_\_\_\_  
**Phone:** \_\_\_\_\_

Approved As To Form: May 25, 2005  
By Alan S. Bachman, Asst Attorney General

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# PAYMENT BOND

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

## KNOW ALL PERSONS BY THESE PRESENTS:

That \_\_\_\_\_ hereinafter referred to as the "Principal," and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_ authorized to do business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); with its principal office in the City of \_\_\_\_\_, hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah hereinafter referred to as the "Obligee," in the amount of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

**WHEREAS**, the Principal has entered into a certain written Contract with the Obligee, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, to construct \_\_\_\_\_ in the County of \_\_\_\_\_, State of Utah, Project No. \_\_\_\_\_ for the approximate sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), which contract is hereby incorporated by reference herein.

**NOW, THEREFORE**, the condition of this obligation is such that if the said Principal shall pay all claimants supplying labor or materials to Principal or Principal's Subcontractors in compliance with the provisions of Title 63, Chapter 56, of Utah Code Annotated, 1953, as amended, and in the prosecution of the Work provided for in said Contract, then, this obligation shall be void; otherwise it shall remain in full force and effect.

That said Surety to this Bond, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the Contract or to the Work to be performed thereunder, or the specifications or drawings accompanying same shall in any way affect its obligation on this Bond, and does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to the Work or to the specifications or drawings and agrees that they shall become part of the Contract Documents.

**PROVIDED, HOWEVER**, that this Bond is executed pursuant to the provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

**IN WITNESS WHEREOF**, the said Principal and Surety have signed and sealed this instrument this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

## WITNESS OR ATTESTATION:

\_\_\_\_\_

## PRINCIPAL:

\_\_\_\_\_

By: \_\_\_\_\_ (Seal)

Title: \_\_\_\_\_

## WITNESS OR ATTESTATION:

\_\_\_\_\_

## SURETY:

\_\_\_\_\_

By: \_\_\_\_\_ Attorney-in-Fact (Seal)

STATE OF \_\_\_\_\_ )  
 ) ss.  
COUNTY OF \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, personally appeared before me \_\_\_\_\_, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

My commission expires: \_\_\_\_\_

Resides at: \_\_\_\_\_

NOTARY PUBLIC

**Agency:** \_\_\_\_\_  
**Agent:** \_\_\_\_\_  
**Address:** \_\_\_\_\_  
**Phone:** \_\_\_\_\_

Approved As To Form: May 25, 2005  
By Alan S. Bachman, Asst Attorney General



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES  
**Division of Facilities Construction and Management**

**DFCM**

**CHANGE ORDER # \_\_\_\_\_**

CONTRACTOR: \_\_\_\_\_

AGENCY OR INSTITUTION: \_\_\_\_\_

PROJECT NAME: \_\_\_\_\_

PROJECT NUMBER: \_\_\_\_\_

CONTRACT NUMBER: \_\_\_\_\_

ARCHITECT: \_\_\_\_\_

DATE: \_\_\_\_\_

CONSTRUCTION CHANGE DIRECTIVE NO.	PROPOSAL REQUEST NO.	AMOUNT		DAYS	
		INCREASE	DECREASE	INCREASE	DECREASE

	Amount	Days	Date
ORIGINAL CONTRACT			
TOTAL PREVIOUS CHANGE ORDERS			
TOTAL THIS CHANGE ORDER			
ADJUSTED CONTRACT			

DFCM and Contractor agree that the terms, contract sum, scope of the Work and time specified in this Change Order shall constitute the full accord and satisfaction, and complete adjustment to the Contract and includes all direct and indirect costs and effects related to, incidental to, and/or reasonably implied from such change in the contract terms, sum, scope of the Work and time.

Contractor: \_\_\_\_\_ Date \_\_\_\_\_

Architect/Engineer: \_\_\_\_\_ Date \_\_\_\_\_

Agency or Institution: \_\_\_\_\_ Date \_\_\_\_\_

DFCM: \_\_\_\_\_ Date \_\_\_\_\_

Funding Verification: \_\_\_\_\_ Date \_\_\_\_\_



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

**Division of Facilities Construction and Management****DFCM****CERTIFICATE OF SUBSTANTIAL COMPLETION**

PROJECT \_\_\_\_\_ PROJECT NO: \_\_\_\_\_

AGENCY/INSTITUTION \_\_\_\_\_

AREA ACCEPTED \_\_\_\_\_

The Work performed under the subject Contract has been reviewed on this date and found to be Substantially Completed as defined in the General Conditions; including that the construction is sufficiently completed in accordance with the Contract Documents, as modified by any change orders agreed to by the parties, so that the State of Utah can occupy the Project or specified area of the Project for the use for which it is intended.

The DFCM - (Owner) accepts the Project or specified area of the Project as Substantially Complete and will assume full possession of the Project or specified area of the Project at \_\_\_\_\_ (time) on \_\_\_\_\_ (date).

The DFCM accepts the Project for occupancy and agrees to assume full responsibility for maintenance and operation, including utilities and insurance, of the Project subject to the itemized responsibilities and/or exceptions noted below:

The Owner acknowledges receipt of the following closeout and transition materials:

☐ Record Drawings      ☐ O & M Manuals      ☐ Warranty Documents      ☐ Completion of Training Requirements

A list of items to be completed or corrected (Punch List) is attached hereto. The failure to include an item on it does not alter the responsibility of the Contractor to complete all the Work in accordance with the Contract Documents, including authorized changes thereof. The amount of \_\_\_\_\_. (Twice the value of the punch list work) shall be retained to assure the completion of the punch list work.

The Contractor shall complete or correct the Work on the list of (Punch List) items appended hereto within \_\_\_\_\_ calendar days from the above date of issuance of this Certificate. If the list of items is not completed within the time allotted the Owner has the right to be compensated for the delays and/or complete the work with the help of independent contractor at the expense of the retained project funds. If the retained project funds are insufficient to cover the delay/completion damages, the Owner shall be promptly reimbursed for the balance of the funds needed to compensate the Owner.

\_\_\_\_\_  
CONTRACTOR (include name of firm)      by: \_\_\_\_\_  
(Signature)      DATE

\_\_\_\_\_  
A/E (include name of firm)      by: \_\_\_\_\_  
(Signature)      DATE

\_\_\_\_\_  
USING INSTITUTION OR AGENCY      by: \_\_\_\_\_  
(Signature)      DATE

\_\_\_\_\_  
DFCM (Owner)      by: \_\_\_\_\_  
(Signature)      DATE

4110 State Office Building, Salt Lake City, Utah 84114  
telephone 801-538-3018 • facsimile 801-538-3267 • <http://dfcm.utah.gov>

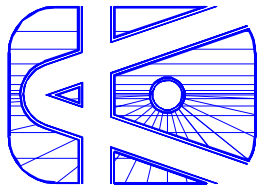
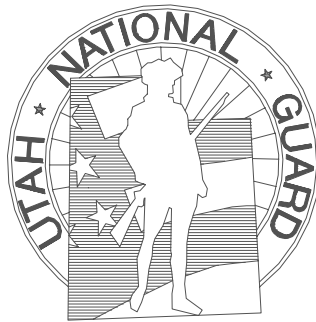
cc: Parties Noted  
DFCM, Director

# PROJECT MANUAL

## DRAPER ARMORY JOINT OPERATIONS CENTER

### UTAH NATIONAL GUARD

DRAPER, UTAH  
DFCM #06036480



L.K. SORENSEN ASSOCIATES, INC.  
3448 SOUTH MAIN STREET  
SALT LAKE CITY, UTAH 84115  
(801) 478-0800 (801) 478-0816 FAX



## PROJECT MANUAL INDEX

UTAH NATIONAL GUARD  
DRAPER ARMORY JOINT OPERATIONS CENTER  
DFCM #06036480  
PROJECT NO. LKS 0612

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15500 FIRE PROTECTION SYSTEM  
15700 HEATING/COOLING/VENTILATING EQUIPMENT  
15800 AIR DISTRIBUTION  
15900 AUTOMATIC TEMPERATURE CONTROL

DIVISION 16 - ELECTRICAL

16050 BASIC ELECTRICAL MATERIALS AND METHODS  
16075 ELECTRICAL IDENTIFICATIONS  
16110 COMMUNICATIONS HORIZONTAL CABLING  
16120 CONDUCTORS AND CABLES  
16130 RACEWAYS AND BOXES  
16140 WIRING DEVICES  
16140 STANDARD WIRING DEVICES SCHEDULES  
16145 LIGHTING CONTROL DEVICES  
16410 ENCLOSED SWITCHES AND CIRCUIT BREAKERS  
16491 FUSES  
16511 INTERIOR LIGHTING  
16860 FIRE ALARM

## SECTION 01010 - SUMMARY

### 1.1 GENERAL

- A. Project Identification: Project consists of interior remodeling to an existing training area within the Utah National Guard Headquarters, Draper, Utah.
  - 1. Project Location: Utah National Guard Draper Armory
  - 2. Owner: State of Utah
- B. Architect Identification: The Contract Documents, dated April 28, 2006 were prepared for Project by:

L. K. SORENSEN ASSOCIATES, INC.  
ARCHITECTS/PLANNERS  
3448 SOUTH MAIN STREET  
SALT LAKE CITY, UTAH 84115  
(801) 478-0800, FAX (801) 478-0816
- C. Scope of work includes: minor demolition to remove interior finishes, and existing exterior door, HVAC systems and electrical systems. New construction includes walls; doors and frames; suspended ceilings; finishes; exterior masonry wall infill for removed door; HVAC equipment, controls and ductwork; electrical lighting, power voice and data systems; and modification to the fire protection system within the remodeled area.
- D. Project will be constructed under a general construction contract.
- E. Use of Premises: Contractor shall have use of the Project site during construction period. Contractor's use of premises will be defined and confirmed during the pre-construction meeting.
- F. Separate Contract: Owner will award separate contracts for performance of certain construction operations at Project site. Those operations may be conducted simultaneously with work under this Contract.
- G. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.
- H. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.
- I. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
  - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
    - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

### 1.2 PRODUCTS (Not Used)

1.3      **EXECUTION (Not Used)**

END OF SECTION 01100

## SECTION 01200 - PROJECT MEETINGS

### 1.1 GENERAL

- A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
  - 1. Pre-construction conferences.
  - 2. Pre-installation conferences.
  - 3. Progress meetings.
- B. Pre-construction Conference: Schedule a pre-construction conference before starting construction. Review responsibilities and personnel assignments.
  - 1. Attendees: Authorized representatives of the Owner, Architect, and their consultants; the Contractor and its superintendent; major subcontractors; and other concerned parties shall attend.
  - 2. Participants shall be familiar with the Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Discuss items that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Critical work sequencing.
    - c. Submittal of Shop Drawings, Product Data, and Samples.
    - d. Use of the premises.
- C. Pre-installation Conferences: Conduct a conference before each activity that requires coordination with other operations.
  - 1. Attendees: The Installer and representatives of manufacturers and fabricators involved in or affected by the installation shall attend. Advise the Architect of scheduled meeting dates.
  - 2. Review the progress of other operations and preparations for the activity under consideration at each pre-installation conference, including requirements for the following:
    - a. Compatibility problems and acceptability of substrates.
    - b. Time schedules and deliveries.
    - c. Manufacturer's recommendations.
    - d. Warranty requirements.
    - e. Inspecting and testing requirements.
  - 3. Record significant discussions and agreements and disagreements, and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect.
  - 4. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate actions necessary to resolve problems and reconvene the conference.
- D. Progress Meetings: Conduct progress meetings at the Project Site at regular intervals. Notify the Owner and the Architect of scheduled dates. Coordinate meeting dates with preparation of the payment request.
  - 1. Attendees: The Owner, Architect, and other entities concerned with current progress or involved in planning, coordination, or future activities shall be represented. Participants shall be authorized to conclude matters relating to the Work.
  - 2. Agenda: Review and correct or approve minutes of the previous meeting. Review items of significance that could affect progress. Include topics for discussion appropriate to Project status.
  - 3. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule.

Determine how to expedite construction behind schedule; secure commitments from parties involved to do so. Discuss revisions required to insure subsequent activities will be completed within the Contract Time.

4. Review the present and future needs of each entity present, including the following:
    - a. Time.
    - b. Sequences.
    - c. Status of submittals.
    - d. Deliveries and off-site fabrication problems.
    - e. Temporary facilities and services.
    - f. Quality and work standards.
    - g. Change Orders.
  5. Reporting: Distribute meeting minutes to each party present and to parties who should have been present. Include a summary of progress since the previous meeting and report.
- E. Schedule Updating: Revise the Contractor's Construction Schedule after each meeting where revisions have been made. Issue the revised schedule concurrently with the report of each meeting.

**1.2 PRODUCTS: (Not Applicable)**

**1.3 EXECUTION: (Not Applicable)**

END OF SECTION 01200

## SECTION 01290 - PAYMENT PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

#### 1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
  - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including **Application for Payment forms with Continuation Sheet, Submittals Schedule and Contractor's Construction Schedule.**
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the Schedule of Values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  - 2. Submit of **AIA Document G703 Continuation Sheets.**
  - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
  - 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  - 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
  - 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
  - 7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
    - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
  - 8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

#### 1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
  - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Progress payments shall be submitted to Architect by the fifth (5<sup>th</sup>) of the month. The period covered by each Application for Payment is one month, ending on the **last day of the month**.
- D. Payment Application Forms: Use **AIA Document G702 and AIA Document G703 Continuation Sheets** as form for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
  2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- F. Transmittal: Submit **3** signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of Values.
  3. Contractor's Construction Schedule (preliminary if not final).
  4. Schedule of unit prices.
  5. Submittals Schedule (preliminary if not final).
  6. List of Contractor's staff assignments.
  7. List of Contractor's principal consultants.
  8. Copies of building permits.
  9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  10. Initial progress report.
  11. Report of preconstruction conference.
  12. Certificates of insurance and insurance policies.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707, "Consent of Surety to Final Payment."
  7. Evidence that claims have been settled.
  8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.



9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

## **SECTION 01310 - COORDINATION**

### **1.1 GENERAL**

- A. This Section includes requirements for coordinating construction operations including, but not necessarily limited to, the following:
  - 1. Coordination drawings.
  - 2. Administrative and supervisory personnel.
  - 3. Cleaning and protection.
- B. Coordinate construction to assure efficient and orderly installation of each part of the Work. Coordinate operations that depend on each other for proper installation, connection, and operation.
  - 1. Schedule operations in the sequence required to obtain the best results where installation of one part depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to assure maximum accessibility for maintenance, service, and repair.
  - 3. Make provisions to accommodate items scheduled for later installation.
- C. Administrative Procedures: Coordinate scheduling and timing of required procedures with other activities to avoid conflicts and assure orderly progress. Such activities include, but are not limited to, the following:
  - 1. Preparation of schedules.
  - 2. Delivery and processing of submittals.
  - 3. Progress meetings.
  - 4. Project closeout activities.
- D. Conservation: Coordinate construction to assure that operations are carried out with consideration for conservation of energy, water, and materials.
  - 1. Salvage materials and equipment involved in performance of, but not incorporated in, the Work.
- E. Coordination Drawings: Prepare coordination drawings if needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space necessitates maximum utilization of space for efficient installation of different components.

### **1.2 PRODUCTS (Not Applicable)**

### **1.3 EXECUTION**

- A. Inspection of Conditions: Require Installers of major components to inspect substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.
- B. Coordinate temporary enclosures with inspections and tests to minimize the need to uncover completed construction.
- C. Clean and protect construction in progress and adjoining materials, during handling and installation. Apply protective covering to assure protection from damage.
- D. Clean and maintain completed construction as necessary through the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

- E. Limiting Exposures: Supervise construction to assure that no part is subject to harmful, dangerous, or damaging exposure. Such exposures include, but are not limited to, the following:
1. Excessive static or dynamic loading.
  2. Excessive internal or external pressures.
  3. Excessively high or low temperatures.
  4. Water or ice.
  5. Solvents and chemicals.
  6. Abrasion.
  7. Soiling, staining, and corrosion.
  8. Combustion.

END OF SECTION 01310

## SECTION 01330 - SUBMITTALS

### 1.1 GENERAL

- A. Submittal Procedures: Coordinate submittal preparation with construction, fabrication, other submittals, and activities that require sequential operations. Transmit in advance of construction operations to avoid delay.
1. Coordinate submittals for related operations to avoid delay because of the need to review submittals concurrently for coordination. The Architect reserves the right to withhold action on a submittal requiring coordination until related submittals are received.
  2. Processing: Allow 2 weeks for initial review. Allow more time if the Architect must delay processing to permit coordination. Allow 2 weeks for reprocessing.
    - a. No extension of Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.
  3. Submittal Preparation: Place a permanent label on each submittal for identification. Provide a 4- by 5-inch (100- by 125-mm) space on the label or beside title block to record review and approval markings and action taken. Include the following information:
    - a. Project name.
    - b. Date.
    - c. Name and address of the Architect.
    - d. Name and address of the Contractor, subcontractor, supplier and/or manufacturer.
    - e. Number and title of appropriate Specification Section, drawing number and detail references, as appropriate.
  4. Submittal Transmittal: Package each submittal appropriately. Transmit with a transmittal form. The Architect will not accept submittals from sources other than the Contractor.
    - a. The Architect will not accept submittals without review and action stamp by the General Contractor.
    - b. **Submittals: Submit 4 copies; submit 6 copies where required for maintenance manuals. The Architect will retain one and return the others marked with action taken.**
- B. Contractor's Construction Schedule: Prepare a horizontal bar-chart-type, contractor's construction schedule. Provide a separate time bar for each activity and a vertical line to identify the first working day of each week. Use the same breakdown of Work indicated in the "Schedule of Values." Indicate estimated completion in 10 percent increments. As Work progresses, mark each bar to indicate actual completion.
1. Submit within 30 days of the date established for "Commencement of the Work."
  2. Secure performance commitments from parties involved. Coordinate each element with other activities; include minor elements involved in the Work. Show each activity in proper sequence. Indicate sequences necessary for completion of related Work.
  2. Coordinate with the Schedule of Values, list of subcontracts, Submittal Schedule, payment requests, and other schedules.
  4. Indicate completion in advance of Substantial Completion. Indicate Substantial Completion to allow time for the Architect's procedures necessary for certification of Substantial Completion.
  5. Work Stages: Indicate important stages for each portion of the Work.
  6. Submittal Schedule: After developing the Contractor's Construction Schedule, prepare a schedule of submittals. Submit within 10 days of submittal of the Construction Schedule.
  7. Coordinate with list of subcontracts, Schedule of Values, list of products, and the Contractor's Construction Schedule.
  8. Schedule Distribution: Distribute copies of the Contractor's Construction Schedule and the Submittal Schedule to the Architect, Owner, subcontractors, and parties required to comply with submittal dates. Post copies in the field office.
  9. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their Work and are no longer involved in construction activities.
- C. Daily Construction Reports: Prepare a daily report recording events at the site. Submit duplicate copies to the Architect at weekly intervals. Include all relevant data and the following information:

1. List of subcontractors at the site including number of workers on each task.
2. High and low temperatures, general weather conditions.
3. Accidents and unusual events.
4. Stoppages, delays, shortages, and losses.
5. Meter readings and similar recordings.
6. Emergency procedures.
7. Orders and requests of governing authorities.
8. Services connected, disconnected.
9. Equipment or system tests and startups.
10. Substantial Completions authorized.

D. Product Data: Collect Product Data into a single submittal for each element of construction. Mark each copy to show applicable choices and options.

1. Where Product Data includes information on several products, mark copies to indicate applicable information. Include the following information:
  - a. Manufacturer's printed recommendations.
  - b. Compliance with trade association standards.
  - c. Compliance with recognized testing agency standards.
  - d. Application of testing agency labels and seals.
  - e. Notation of dimensions verified by field measurement.
  - f. Notation of coordination requirements.
2. Distribution: Furnish copies to installers, subcontractors, suppliers, and others required for performance of construction activities. Show distribution on transmittal forms. Do not proceed with installation until a copy of Product Data is in the Installer's possession.

E. Samples: Submit full-size Samples cured and finished as specified and identical with the material proposed. Mount Samples to facilitate review of qualities.

1. Submit Samples for review of size, kind, color, pattern, and texture, for a check of these characteristics, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed. Where variations are inherent in the material, submit at least 3 units that show limits of the variations.

F. Quality Assurance Submittals: Submit quality-control submittals, including design data, certifications, manufacturer's instructions, and manufacturer's field reports required under other Sections of the Specifications.

1. Certifications: Where certification that a product or installation complies with specified requirements is required, submit a notarized certification from the manufacturer certifying compliance.
2. Signature: Certification shall be signed by an officer authorized to sign documents on behalf of the company.

G. Architect's Action: Except for submittals for the record or information, where action and return are required, the Architect will review each submittal, mark to indicate action taken, and return. Compliance with specified characteristics is the Contractor's responsibility.

1. Action Stamp: The Architect will stamp each submittal with an action stamp. The Architect will mark the stamp appropriately to indicate the action taken.

## **1.2 PRODUCTS (Not Applicable)**

## **1.3 EXECUTION (Not Applicable)**

END OF SECTION 01330

## SECTION 01400 - QUALITY CONTROL

### 1.1 GENERAL

- A. Quality-control services include inspections, tests, and related actions, including reports, by independent agencies, and by governing authorities under the direction of the Contractor. They do not include contract activities performed by the Architect.
  - 1. Contractor Responsibilities: Contractor shall provide all inspections and tests specified and required by authorities having jurisdiction and as described herein.
    - a. The Contractor shall employ and pay a qualified independent testing agency to perform all Quality Control services.
    - b. All costs for these services are included in the Contract Sum.
- B. Retesting: The Contractor is responsible for retesting where results of inspections and tests prove unsatisfactory and indicate noncompliance with requirements.
  - 1. The cost of retesting is the Contractor's responsibility where tests performed indicated noncompliance with requirements.
- C. Auxiliary Services: Cooperate with governing agencies performing inspections and tests. Provide auxiliary services as requested. Notify the agency in advance of operations to permit assignment of personnel. Auxiliary services include the following:
  - 1. The contractor shall schedule and coordinate inspection performed by all other governing agencies, and shall provide or perform the following:
    - a. Provide access to the Work.
    - b. Furnish incidental labor and facilities to assist inspections and tests.
    - c. Take adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
    - d. Provide facilities for storage and curing of test samples.
    - e. Deliver samples to testing laboratories.
    - f. Provide preliminary design mix proposed for use for materials mixes that require control by the testing agency.
    - g. Provide security and protection of samples and test equipment.
- D. Duties of the Testing Agency: The testing agency shall cooperate with the Contractor in performing its duties. The agency shall provide qualified personnel to perform inspections and tests.
  - 1. The agency shall notify the Architect, appropriate Engineers, and the Contractor of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. The agency shall not release, revoke, alter, or enlarge requirements or approve or accept any portion of the Work.
  - 3. The agency shall not perform duties of the Contractor.
  - 4. The Contractor is responsible for scheduling inspections, tests, taking samples, and similar activities.
- E. Submittals: The testing agency shall submit a certified written report, in duplicate, of each inspection and test to the Architect and the Structural Engineer. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection or test through the Contractor.
  - 1. Submit additional copies of each report to the governing authority, when the authority so directs.
  - 2. Report Data: Reports of each inspection, test, or similar service include, but are not limited to, the following:
    - a. Date of issue.
    - b. Project title and number.

- c. Name, address, and telephone number of testing agency.
- d. Dates and locations of samples and tests or inspections.
- e. Names of individuals making the inspection or test.
- f. Designation of the Work and test method.
- g. Identification of product and Specification Section.
- h. Complete inspection or test data.
- i. Test results and an interpretation of test results.
- j. Ambient conditions at the time of sample taking and testing.
- k. Comments or professional opinion on whether inspected or tested Work complies with requirements.
- l. Name and signature of laboratory inspector.
- m. Recommendations on retesting.

## **1.2 PRODUCTS**

- A. TESTING AGENCY SHALL BE APPROVED BY THE OWNER.
- B. THE COST FOR THESE SERVICES SHALL BE INCLUDED IN THE CONTRACTOR=S SCOPE OF WORK.

## **1.3 EXECUTION**

- A. Repair and Protection: Upon completion of inspection, testing, and sample taking, repair damaged construction. Restore substrates and finishes. Comply with Division 1 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for inspection and testing.

END OF SECTION 01400

## SECTION 01420 - REFERENCE STANDARDS AND DEFINITIONS

### 1.1 GENERAL

A. Definitions: Basic contract definitions are included in the Conditions of the Contract.

1. "Indicated" refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the reader locate the reference. Location is not limited.
2. "Directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Architect, requested by the Architect, and similar phrases.
3. "Approved," when used in conjunction with the Architect's action on the Contractor's submittals, applications, and requests, is limited to the Architect's duties and responsibilities as stated in the Conditions of the Contract.
4. "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
5. "Furnish" means supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.
6. "Install" describes operations at the Project Site including the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
7. "Provide" means to furnish and install, complete and ready for the intended use.
8. "Installer" is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
9. "Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
10. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.
11. Specification Format: These Specifications are organized into Divisions and Sections based on CSI's 16-Division format and MasterFormat's numbering system.
12. Abbreviated Language: Language used in Specifications is abbreviated. Implied words and meanings shall be interpreted as appropriate. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
13. Streamlined Language: The Specifications generally use the imperative mood and streamlined language. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
14. Copies of Standards: Copies of applicable standards are not bound with the Contract Documents. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.
15. Abbreviations and Names: Where acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research Co.'s "Encyclopedia of Associations," available in most libraries.
16. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established in conjunction with compliance with standards and regulations bearing upon performance of the Work.



**1.2 PRODUCTS (Not Applicable)**

**1.3 EXECUTION (Not Applicable)**

END OF SECTION 01420

## **SECTION 01500 - TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS**

### **1.1 GENERAL**

- A. Summary: This Section specifies construction facilities and temporary controls including temporary utilities, support facilities, and security and protection facilities.
- B. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
  - 1. Building code requirements.
  - 2. Health and safety regulations.
  - 3. Utility company regulations.
  - 4. Police, fire department, and rescue squad rules.
  - 5. Environmental protection regulations.
  - 6. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
  - 7. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."
  - 8. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

### **1.2 PRODUCTS**

- A. Materials: Provide new materials. If acceptable to the Architect, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.
- B. Fire Extinguishers: Hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
  - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

### **1.3 EXECUTION**

- A. Installation, General: Use qualified personnel to install temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
  - 1. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
  - 2. Conditions of Use: Keep temporary facilities clean and neat in appearance. Operate safely and efficiently. Relocate as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.
- B. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect. Neither the Owner nor Architect will accept cost or use charges as a basis of claims for Change Orders.
- C. Temporary Water Service: Install temporary water service and distribution piping of sizes and

pressures adequate for construction. Maintain service until permanent water service is in use. Sterilize piping prior to use.

- D. Temporary Electric Power: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear. Install service underground.
  - 1. Temporary Lighting: Provide temporary lighting with local switching to fulfill security requirements and illumination for construction operations and traffic conditions.
- E. Temporary Heat: Provide temporary heat for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations. Coordinate ventilation requirements to produce ambient condition required and minimize consumption of energy.
- F. Temporary Telephones: Provide temporary telephone service for personnel engaged in construction. Install a separate line for each temporary office and first-aid station. Provide a dedicated telephone line for a fax machine in the field office. At each telephone, post a list of important telephone numbers.
- G. Sanitary Facilities: Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers.
  - 1. Toilets: Install self-contained, single-occupant toilet units of the chemical, aerated re-circulation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
  - 2. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled drinking-water units.
- H. Support Facilities Installation: Locate field offices, storage sheds, and other construction and support facilities for easy access. Maintain facilities until near Substantial Completion. Remove prior to Substantial Completion.
  - 1. Provide incombustible construction for offices, shops, and sheds located within the construction area or within 30 feet (9 m) of building lines. Comply with requirements of NFPA 241.
    - a. Furnish field offices with a desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase.
    - b. Provide a telephone with an answering machine and a fax machine at the project site.
- I. Temporary Enclosures: Provide temporary enclosures for protection of construction from exposure, foul weather, other construction operations, and similar activities. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions.
- J. Project Signs: Install project identification and other signs where indicated to inform the public and persons seeking entrance to the Project. Support on framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs. Engage an experienced sign painter to apply graphics.
  - 1. Sign size will be four feet by eight feet with appropriate mounting posts.
  - 2. Comply with lettering text and format details indicated, or to be provided by the Architect.
- K. Waste Collection and Disposal: Collect waste daily. Comply with requirements of NFPA 241. Enforce requirements strictly. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

- L. Temporary Fire Protection: Until permanent facilities supply fire-protection needs, install and maintain temporary fire-protection facilities of types needed to protect against controllable fire losses. Comply with NFPA 10 and NFPA 241.
  - 1. Locate fire extinguishers where convenient and effective for their intended purpose.
- M. Barricades, Warning Signs, and Lights: Comply with code requirements for erection of barricades. Paint with appropriate colors, graphics, and warning signs. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- N. Environmental Protection: Operate temporary facilities and conduct construction in ways that comply with environmental regulations and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise-making equipment to hours that will minimize complaints.
- O. Maintenance: Maintain facilities in operating condition until removal. Protect from damage by freezing temperatures and similar elements. Maintain temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid damage.
- P. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect during excavation.
- Q. Termination and Removal: Remove each temporary facility when the need has ended, when replaced by a permanent facility, or no later than Substantial Completion. Complete or restore permanent construction delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.
  - 2. At Substantial Completion, clean and renovate permanent facilities used during the construction period.
  - 3. Replace air filters and clean inside of ductwork and housings.
  - 4. Replace worn parts and parts subject to unusual operating conditions.
  - 5. Replace burned out lamps.

END OF SECTION 01500

## **SECTION 01600 - MATERIALS AND EQUIPMENT**

### **1.1 GENERAL**

- A. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock.
  - 1. "Named Products" are items identified by the manufacturer's product name, including make or model number or designation, shown or listed in the manufacturer's published product literature.
- B. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
- C. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.
- D. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
  - 1. When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected.
- E. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
  - 1. Schedule delivery to minimize long-term storage and to prevent overcrowding construction spaces. Coordinate with installation to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 2. Deliver products in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 3. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
  - 4. Store products to facilitate inspection and measurement of quantity or counting of units. Store heavy materials away from the structure in a manner that will not endanger the supporting construction.
  - 5. Store products subject to damage by the elements aboveground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

### **1.2 PRODUCTS**

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
  - 1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.
- B. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  - 1. Where products are specified by name, accompanied by the term "or equal," comply with provisions concerning "substitutions" to obtain approval for use of an unnamed product.
- C. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply and are recommended for the application. Manufacturer's recommendations may be contained in product literature or by the manufacturer's

certification of performance.

- D. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.
- E. Visual Matching: Where Specifications require matching a Sample, the Architect's decision on whether a product matches will be final. Where no product in the specified category matches and complies with other requirements, comply with provisions concerning "substitutions" for selection of a matching product in another category.
- F. Visual Selection: Where requirements include the phrase "... as selected from manufacturer's standard colors, patterns, textures ..." or a similar phrase, select a product that complies with other requirements. The Architect will select the color, pattern, and texture from the product line selected.

### **1.3 EXECUTION**

- A. Comply with manufacturer's instructions for installation of products. Anchor each product securely in place, accurately located and aligned with other Work. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

## SECTION 01631 - PRODUCTS AND SUBSTITUTIONS

### 1.1 GENERAL

- A. Source Limitations: To the fullest extent possible, provide products of the same generic kind, from a single source, for each unit of work. Where it is not possible to do so, match separate procurement as closely as possible to the extent that the product selection process is under the Contractor's control.
- B. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock.
- C. "Named Products" are items identified by manufacturer's product name, including make or model designation indicated in the manufacturer's product literature.
- D. "Materials" are products that are shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
- E. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.
- F. Nameplates: Except for required labels and operating data, do not attach manufacturer's nameplates or trademarks on surfaces exposed to view in occupied spaces or on the exterior.
- G. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an inconspicuous accessible surface. The nameplate shall contain the following information and essential operating data:
  - 1. Name of product and manufacturer.
  - 2. Model and serial number.
  - 3. Capacity, Speed and Ratings.
- H. Product Delivery, Storage, and Handling: Deliver, store and handle products in accordance with manufacturer's recommendations, using methods that will prevent damage, deterioration and loss.
  - 1. Schedule delivery to minimize long-term storage and prevent overcrowding construction spaces. Coordinate with installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
  - 2. Deliver products in manufacturer's original sealed container or packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
  - 3. Inspect products on delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.
  - 4. Store products to facilitate inspection and measurement of quantity or counting of units. Store heavy materials away from the structure in a manner that will not endanger supporting construction.
  - 5. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.
- I. Product Selection: Provide products that comply with the Contract Documents, are undamaged and unused at installation.
  - 1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
- J. Descriptive Specification Requirements: Where Specifications describe a product, listing characteristics required, with or without use of a brand name, provide a product that provides the characteristics and otherwise complies with requirements as approved by the Architect.

- K. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply and are recommended for the application as approved by the Architect.
- L. Compliance with Standards: Where Specifications require compliance with a standard, select a product that complies with the standard specified.
- M. Visual Matching: Where Specifications require matching a Sample, the Architect's decision on whether a proposed product matches is final. Where requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product that complies with other requirements. The Architect will select color, pattern and texture from the product line selected.
- N. Substitutions - Conditions: The Contractor's requests for substitutions may be considered when they are reasonable, timely, fully documented, and when they are approved by the architect.
- O. Submittals: Include the following information, as appropriate, in each request for substitution:
  - 1. Provide complete product documentation, including product data and samples, where appropriate.
  - 2. Provide detailed performance comparisons and evaluation, including testing laboratory reports where applicable.
  - 3. Provide coordination information indicating the effect of the substitution on other work and the time schedule.
  - 4. Provide cost information for the proposed change order.
  - 5. Provide the Contractor's general certification of the recommended substitution.
- P. Change Order: Approval of substitutions is possible only by the change order procedure.
- Q. Delivery, Storage, and Handling: Receive, store and handle products, materials and equipment in a manner which will prevent loss, deterioration and damage. Schedule deliveries so as to minimize long-term storage at the project site.

## **1.2 PRODUCTS (Not used)**

## **1.3 EXECUTION**

- A. Installation of Products: Comply with manufacturer's instructions and recommendations for installation of products. Anchor each product securely in place, accurately located and aligned with other Work. Clean exposed surfaces and protect to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01631



## **SECTION 01731 - CUTTING AND PATCHING**

### **1.1 GENERAL**

- A. Operational Limitations: Do not cut and patch operating elements in a manner that would reduce their capacity to perform as intended. Do not cut and patch operating elements in a manner that would increase maintenance or decrease operational life or safety.
- B. Visual Requirements: Do not cut and patch exposed construction in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.
- C. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
  - 1. Obtain approval before cutting and patching the following structural elements:
    - a. Foundation construction.
    - b. Bearing and retaining walls.
    - c. Structural members and primary wood framing.

### **1.2 PRODUCTS**

- A. Use materials identical to existing materials. Use materials that visually match adjacent surfaces to the fullest extent possible if identical materials are unavailable. Use materials whose performance will equal that of existing materials.

### **1.3 EXECUTION**

- A. Examine surfaces to be cut and patched and conditions under which work is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action.
- B. Before proceeding, meet with parties involved. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect existing construction to prevent damage. Provide protection from adverse weather conditions for portions that might be exposed during cutting and patching operations.
  - 1. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
  - 2. Avoid cutting pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.
- E. Performance: Employ skilled workmen. Proceed at the earliest feasible time and complete without delay.
  - 1. Cut construction to install other components or perform other construction and subsequent fitting

and patching required to restore surfaces to their original condition.

- F. Cutting: Cut using methods that will not damage elements retained or adjoining construction. Comply with the original Installer's recommendations.
1. Use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  2. To avoid marring finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  3. Cut through concrete and masonry using a cutting machine, such as a Carborundum saw or a diamond-core drill.
- G. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar items. Clean piping, conduit, and similar features before applying paint or finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 01731

## SECTION 01740 - WARRANTIES AND BONDS

### 1.1 GENERAL

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.
  - 1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.
- C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
- D. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
  - 1. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
  - 2. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
  - 3. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
  - 4. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  - 5. Where the Contract Documents require a special warranty, or similar commitment, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.
- E. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties upon request of the Architect.
  - 1. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.
  - 2. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- F. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.
  - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
  - 2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.

3. Provide four (4) copies of the warranties.

## **1.2 PRODUCTS (Not Applicable)**

## **1.3 EXECUTION**

- A. Provide warranties on products and installations as specified in all Sections of the Specifications:

END OF SECTION 01740

## SECTION 01770 - CONTRACT CLOSEOUT

### 1.1 GENERAL

- A. Closeout requirements for specific construction activities are also included in the appropriate Sections in Divisions 2 through 16.
- B. Substantial Completion: Before requesting inspection for certification of Substantial Completion, complete the following:
1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show only 100 percent completion for the Work claimed as substantially complete.
  2. Include supporting documentation for completion and an accounting of changes to the Contract Sum.
  3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
  4. Submit record drawings, maintenance manuals, final project photographs, and similar final record information.
  5. Deliver tools, spare parts, extra stock, and similar items.
  6. Changeover locks and transmit keys to the Owner.
  7. Complete startup testing of systems and instruction of operation and maintenance personnel. Remove temporary facilities, mockups, construction tools, and similar elements.
  8. Complete final cleanup requirements, including touch-up painting.
  9. Touch up and repair and restore marred, exposed finishes.
- C. Inspection Procedures: On receipt of a request for inspection, the Architect will proceed or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Architect will repeat inspection when requested and assured that the Work is substantially complete.
  2. Results of the completed inspection will form the basis of requirements for final acceptance.
- D. Final Acceptance: Before requesting inspection for certification of final acceptance and final payment, complete the following:
1. Final payment request with releases and supporting documentation. Include insurance certificates where required.
  2. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.
- E. Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work has been completed, except for items whose completion is delayed under circumstances acceptable to the Architect.
1. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance. If the Work is incomplete, the Architect will advise the Contractor of Work that is incomplete or obligations that have not been fulfilled but are required.
  2. If necessary, reinspection will be repeated.
- F. Record Document Submittals: Do not use record documents for construction. Protect from loss in a secure location. Provide access to record documents for the Architect's reference.
- G. Record Drawings: Maintain a set of prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the drawing most capable of showing conditions fully and accurately. Give attention to concealed elements.

1. Mark sets with red pencil. Use other colors to distinguish between variations in separate categories of the Work.
  2. Organize record drawing sheets into manageable sets. Bind with durable-paper cover sheets; print titles, dates, and other identification on the cover of each set.
  3. Provide other record drawings identified in individual specification sections.
- H. Record Specifications: Maintain one copy of the Project Manual, including addenda. Mark to show variations in Work performed in comparison with the text of the Specifications and modifications. Give attention to substitutions and selection of options and information on concealed construction. Note related record drawing information and Product Data.
1. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.
- I. Maintenance Manuals: Organize operation and maintenance data into sets of manageable size. Bind in individual, heavy-duty, 2-inch (51-mm), 3-ring, binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder.
1. SEE OTHER DIVISIONS FOR SPECIFIC REQUIREMENTS.

## **1.2 PRODUCTS (Not Applicable)**

## **1.3 EXECUTION**

- A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires maintenance to provide instruction in proper operation and maintenance.
1. SEE OTHER DIVISIONS FOR SPECIFIC REQUIREMENTS.
- B. Final Cleaning: Employ experienced cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Complete the following operations before requesting inspection for certification of Substantial Completion.
1. Remove labels that are not permanent labels.
  2. Clean transparent materials, including mirrors and glass. Remove glazing compounds. Replace chipped or broken glass.
  3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Leave concrete floors broom clean. Vacuum carpeted surfaces.
  4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures and lamps.
  5. Clean the site of rubbish, litter, and foreign substances. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.
- C. Removal of Protection: Remove temporary protection and facilities.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials and dispose of lawfully.

END OF SECTION 01770

## SECTION 02221 - BUILDING DEMOLITION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes demolition and removal of the following:
  - 1. Interior building elements and finishes.
- B. See Division 15 Sections for demolishing or relocating mechanical items.
- C. See Division 16 Sections for demolishing or relocating electrical items.
- D. See general demolition, remodeling and renovation notes on drawings.

#### 1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or recycled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.
- C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or recycled.

#### 1.3 SUBMITTALS

- A. Qualification Data: For the following:
  - 1. Demolition firm.
  - 2. Refrigerant recovery technician.
- B. Proposed Protection and Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate. Include measures for the following:
  - 1. Environmental protection.
  - 2. Dust control.
  - 3. Noise control.
- C. Schedule of Building Demolition Activities: Indicate detailed sequence of demolition and removal work, with starting and ending dates for each activity, interruption of utility services, and locations of temporary protection and means of egress.
- D. Pre-demolition **Photographs or Videotape**: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by building demolition operations. Submit before Work begins.
- E. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

#### 1.4 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.

#### 1.5 PROJECT CONDITIONS

- A. The existing building will continue to be used during demolition and construction.
- B. Owner assumes no responsibility for existing building elements and finishes to be demolished.
  - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. Storage or sale of removed items or materials on-site is not permitted.

#### 1.6 COORDINATION

- A. Arrange demolition schedule so as not to interfere with Owner's.

### **PART 2 - PRODUCTS: (Not Used)**

### **PART 3 - EXECUTION**

#### 3.1 EXAMINATION

- A. Survey existing conditions and correlate with requirements indicated to determine extent of building demolition required.
- B. Inventory and record the condition of items to be removed and salvaged.



- C. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to Architect.
- D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

### 3.2 PREPARATION

- A. Refrigerant: Remove and store refrigerant according to 40 CFR 82 and regulations of authorities having jurisdiction.
- B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
  - 1. Arrange to shut off indicated utilities with utility companies.
  - 2. If utility services are required to be removed, relocated, or abandoned, before proceeding with building demolition provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
  - 3. Cut off pipe or conduit a minimum of 24 inches (610 mm) below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
- C. Existing Utilities: Refer to Division 15 and 16 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.
- D. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
  - 1. Remove demolished items from the project site daily.

### 3.3 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations.
- B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during demolition and cleaned and reinstalled in their original locations after demolition operations are complete.
- C. Existing Utilities: Maintain utility services indicated to remain and protect them against damage during demolition operations.
  - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
  - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
    - a. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.
- D. Temporary Protection: Erect temporary protection where required.
  - 1. Protect existing site improvements, appurtenances, and landscaping to remain.

2. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
3. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
4. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.

### 3.4 DEMOLITION, GENERAL

- A. General: Demolish indicated existing buildings and structures completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
  1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
  2. Maintain adequate ventilation when using cutting torches.
  3. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner or building manager and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
  2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Concrete: Cut concrete full depth at junctures with construction indicated to remain, using power-driven saw, then remove concrete between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished at junctures with construction indicated to remain, then break up and remove.
- E. Equipment: Disconnect equipment at nearest fitting connection to services, complete with service valves. Remove as whole units, complete with controls.
- F. Existing Utilities: Disconnect and cap existing utilities to be abandoned.

### 3.5 REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by building demolition operations.
- B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
- C. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

### 3.6 RECYCLING DEMOLISHED MATERIALS

- A. General: Separate recyclable demolished materials from other demolished materials to the maximum extent possible. Separate recyclable materials by type.

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them each day.

### 3.8 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION 02221

## **SECTION 03100 - CONCRETE FORMWORK**

### **PART 1 - GENERAL:**

- A. The section applies to minor concrete construction and/or repair work.
- B. Comply with all pertinent codes and regulations and all recommendations contained in Recommended Practice for Concrete Formwork, publication ACI 347 of the American Concrete Institute, latest edition.

### **PART 2 - PRODUCTS:**

- A. Use approved removable panel type metal forms.
- B. Form sealers shall be first quality of their respective kinds and subject to the approval of the Owner containing no oil or paraffin.

### **PART 3 - EXECUTION:**

- A. Form for all required cast-in-place concrete to the shapes, sizes, lines, and dimensions indicated on the Drawings or as required by actual conditions at the site.
- B. Properly brace and tie the forms together so as to maintain position and shape and to ensure safety to personnel.
- C. Construct all forms straight, true, plumb, and square.

END OF SECTION 03100



## **SECTION 03200 - CONCRETE REINFORCEMENT**

### **PART 1 – GENERAL**

- A. The section applies to minor concrete construction and/or repair work
- B. Comply with all current, adopted, 2003 edition of the International Building Coded (IBC) regulations, ACE 318-83, and all pertinent recommendations contained in Manual of Standard Practice for Detailing Reinforced Concrete Structures, publication ACE 315 of the American Concrete Institute, latest edition.
- C. Provide Shop Drawings
- D. Conform with General and Construction Notes in Contract Documents.

### **PART 2 - PRODUCTS:**

- A. Reinforcement: Specifications for Deformed and Plain Billet-Steel Bars for Concrete reinforcement, ASTM A-615-81, grade 60.
- B. Wire fabric: Specification for Welded Steel Wire Fabric for Concrete Reinforcement, ASTM A-185.

### **PART 3 - EXECUTION:**

- A. Fabricate and place all reinforcement in strict accordance with Shop Drawings.

END OF SECTION 03200

## **SECTION 03300 - CAST-IN-PLACE CONCRETE**

### **PART 1 – GENERAL**

- A. The section applies to minor concrete construction and/or repair work.
- B. Comply with Structural Concrete for Building ACI301 and Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete ACI340 of the American Concrete Institute.
- C. Ready Mix concrete shall comply with ASTM C94-91 or current edition.
- D. Provide 2 year written guarantee.

### **PART 2 – PRODUCTS**

- A. Portland Cement shall comply with Standard Specifications for Portland Cement. (ASTM-C-150).
- B. Concrete aggregates shall conform to the Tentative Specifications for Concrete Aggregated. (ASTM-C-33).
- C. Water shall be clean and free of deleterious amounts of acids, alkalies or organic materials.

### **PART 3 – EXECUTION**

- A. Extent of this work is indicated in the drawings.
- B. Minimum strength of concrete for footings and foundations shall be 3,000 PSI.  
Minimum strength of concrete for floor slabs and walks shall be 4,000 PSI.

END OF SECTION 03300

## **SECTION 04810 - UNIT MASONRY ASSEMBLIES**

### **PART 1 – GENERAL**

- A. The section applies to minor masonry construction and/or repair work
- B. All brick and block units shall match size, color and installation of existing brick and block used on adjacent walls and surfaces.
- C. Submittals: Shop Drawings for masonry reinforcing bars; comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Material Certificates for each type of masonry unit required.

### **PART 2 – PRODUCTS**

- A. Concrete Masonry Units: IBC Standards. Normal weight, Type I, moisture-controlled units.
- B. Atlas Brick: match existing size, color and installation.
- C. Mortar and Grout Materials: Portland Cement: ASTM C 150, Type I or II. Hydrated Lime: ASTM C 207, Type S. Mortar Cement: ASTM C 1329. Aggregate for Mortar: ASTM C 144. Aggregate for Grout: ASTM C 404. Water: Potable.
- D. Steel Reinforcing Bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including Supplement 1; or ASTM A 617/A 617M, Grade 60.
- E. Masonry Joint Reinforcement: IBC Standard mill galvanized, carbon-steel wire for interior walls and hot-dip galvanized, carbon-steel wire for exterior walls. For single-wythe masonry, provide ladder or truss type spaced not more than 16 inches o.c.
- F. Ties and Anchors: Provide where shown or required.
- G. Insulation: Loose-Granular Fill Insulation: Perlite complying with ASTM C 549, Type II or IV.
- H. Masonry Cleaners: Manufacturer's standard-strength acidic cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains without discoloring or damaging masonry surfaces.
- I. Mortar for Unit Masonry: ASTM C 270, Proportion Specification.
- J. Grout for Unit Masonry: IBC Standards, minimum 2000 psi.

### **PART 3 – EXECUTION**

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602.
- B. Running Bond Pattern for Exposed Masonry to match existing installation.
- C. Build in items specified under this and other Sections of the Specifications.
- D. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, and similar items, unless otherwise indicated.
- E. Lay hollow masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
- F. Tool exposed joints slightly concave when thumb-print hard to match existing installation.



- G. Install insulation in accordance with manufacturer=s recommendations.
- H. Provide continuous masonry joint and cell reinforcement.
- I. Provide masonry lintels where shown.
- J. Placing Reinforcement: Comply IBC requirements.
- K. Grouting: Comply with IBC requirements.
- L. Quality Control: Comply with IBC requirements.
- M. Cleaning: In accordance with manufacturer=s recommendations

END OF SECTION 04810

## SECTION 05500 - METAL FABRICATIONS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Miscellaneous steel framing and supports.
  - 2. Loose steel lintels.

#### 1.2 SUBMITTALS

- A. Shop Drawings: Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- B. Templates: For anchors and bolts.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

#### 2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.
- B. Ferrous Metals:
  - 1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

#### 2.3 FASTENERS

- A. General: Type **304** stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

#### 2.4 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI #79.

## 2.5 FABRICATION

- A. General: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
  - 1. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
  - 2. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.
  - 3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
  - 4. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- B. Miscellaneous Framing and Supports: Provide steel framing and supports not specified in other Sections as needed to complete the Work. Fabricate units from steel shapes, plates, and bars of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.
- C. Loose Steel Lintels: Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
  - 1. Lintels in Exterior Walls: **Galvanize**.
- D. Miscellaneous Steel Trim: Fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

## 2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal fabrications after assembly.
- B. Steel and Iron Finishes:
  - 1. Hot-dip galvanize items as indicated to comply with ASTM A 123/A 123M or ASTM A 153/A 153M as applicable.
  - 2. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below for environmental exposure conditions of installed metal fabrications:
    - a. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
    - b. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
  - 3. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting," for shop painting.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.
  - 1. Fit exposed connections accurately together. Weld connections that are not to be left as exposed joints but cannot be shop welded. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication.
  - 2. Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
  - 3. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

END OF SECTION 05500

## SECTION 06100 - ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:

1. Wood blocking.
2. Wood nailers.
3. Plywood backing panels.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product indicated.
1. Include data for wood-preservative and fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that materials comply with requirements.
- B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses.
- C. Research/Evaluation Reports: For the following:
1. Treated wood.
  2. Engineered wood products.
  3. Power-driven fasteners.
  4. Powder-actuated fasteners.
  5. Expansion anchors.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

#### 2.2 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
1. Factory mark each piece of lumber with grade stamp of grading agency.
  2. Provide dressed lumber, S4S, unless otherwise indicated.
  3. Provide dry lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.
- B. Wood Structural Panels:

1. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.

## 2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWPA C2 (lumber), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWWPA C31 with inorganic boron (SBX).
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
- C. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  2. Wood sills, sleepers, blocking, stripping, and similar concealed members in contact with masonry or concrete.

## 2.4 DIMENSION LUMBER

- A. General: Of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.
- B. Framing Other Than Non-Load-Bearing Partitions: Construction or No. 2 grade and any of the following species:
  1. Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; NLGA, WCLIB, or WWPA.
  2. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
  3. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
- C. Provide miscellaneous lumber for support or attachment of other construction, including the following:
  1. Rooftop equipment bases and support curbs.
  2. Blocking.
  3. Cants.
  4. Nailers.

## 2.5 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels and Mounting Panels In Walls For Other Devices: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch (12.7 mm) thick.

## 2.6 MISCELLANEOUS MATERIALS

- A. Fasteners:
  1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2. Power-Driven Fasteners: CABO NER-272.
3. Bolts: Steel bolts complying with **ASTM A 307, Grade A** (**ASTM F 568M, Property Class 4.6**); with **ASTM A 563** (**ASTM A 563M**) hex nuts and, where indicated, flat washers.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  1. CABO NER-272 for power-driven fasteners.
- C. Fastening Methods:
  1. Plywood Backing Panels: Screw to supports.

END OF SECTION 06100

## **SECTION 07210 - INSULATION**

### **PART 1 - GENERAL**

A. Work included in this section:

1. Unfaced Acoustical Insulation

- B. Fire Performance Characteristics: Provide insulation with fire performance characteristics indicated per ASTM E 119, ASTM E 84 and E 136, as applicable, and which correspond to Products listed in UL "Fire Resistance Directory" or "Building Materials Directory".
- C. Maximum Allowable Asbestos Content: Less than 0.25% by weight of asbestos of any type or mixture of types occurring naturally as impurities, as determined by polarized light microscopy test per Appendix A of 40 CFR 763.
- D. Submittals: Submit product data for each form and type of insulation indicated.

### **PART 2 - PRODUCTS**

- A. General: Provide preformed units in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths and lengths.
- B. Un-Faced Batt Acoustical insulation: Minimum 3 ½ inch in walls.
1. Faced Mineral Fiber Blanket/Batt Insulation: ASTM C 665 for Type III, Class A .
- a) Mineral Fiber Type: Fibers manufactured from glass.
  - b) Combustion Characteristics: Unfaced materials passes ASTM E 136 test.
  - c) Surface Burning Characteristics: Maximum flame spread and smoke developed value of 25.
6. Mechanical Anchors: Type and size recommended by insulation manufacturer.

### **PART 3 - EXECUTION**

- A. Installation – General: Support insulation units by mechanical anchorage as applicable to location and conditions indicated.
- B. Install mineral fiber blanket/batt insulation in accordance with manufacturer's recommendations for framing system provided.

END OF SECTION 07210



## SECTION 07841 - THROUGH-PENETRATION FIRESTOP SYSTEMS

### 1.1 GENERAL

- A. Performance Requirements: Provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
  - 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
  - 2. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
    - a. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
    - b. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
    - c. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- B. Submittals: In addition to Product Data for each type of product specified, submit the following:
  - 1. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction.
  - 2. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
  - 3. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the requirements of the Uniform Building Code and the office of the Utah State Fire Marshal.

### 1.2 PRODUCTS

- A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application that are produced by one of the following manufacturers:
  - 1. A/D Fire Protection Systems Inc.
  - 2. DAP Inc.
  - 3. Firestop Systems Inc.
  - 4. Hilti Construction Chemicals, Inc.
  - 5. Instant Firestop Mfg. Inc.
  - 6. International Protective Coatings Corp.
  - 7. Isolatek International.
  - 8. Nelson Firestop Products.
  - 9. NUCO Industries.
  - 10. RectorSeal Corporation (The).
  - 11. Specified Technologies Inc.
  - 12. 3M Fire Protection Products.
  - 13. Tremco.
  - 14. United States Gypsum Company.
- B. Firestopping, General: Provide through-penetration firestop systems that are compatible with one

another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

- C. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Paragraph. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
  - 1. Permanent forming/damming/backing materials.
  - 2. Temporary forming materials.
  - 3. Substrate primers.
  - 4. Collars.
  - 5. Steel sleeves.

### **1.3 EXECUTION**

- A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Paragraph and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

END OF SECTION 07841

## SECTION 07900 - JOINT SEALERS

### PART 1 - GENERAL

- A. Preconstruction Field Tests: Prior to installation of joint sealers, field-test their adhesion to joint substrates as recommended in ASTM C 962.
- B. Submittals: In addition to product data submit the following:
  - 1. Samples of each type and color of joint sealer required.
  - 2. Certified test reports for joint sealers evidencing compliance with requirements.
- C. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under service and application conditions, as demonstrated by testing and field experience.
- D. Colors: Provide color of exposed joint sealers as selected by Architect from manufacturer's standard colors.
- E. Guarantee: Provide one year written guarantee for material and workmanship.

### PART 2 - PRODUCTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated, complying with ASTM C 920 requirements.
  - 1. One-Part Non-Acid-Curing Silicone Sealant: Type S; Grade NS; Class 25; and complying with the following requirements:
    - a. Medium-Modulus: Tensile strength of not less than 45 nor more than 75 psi or less at 100% elongation when tested after 14 days at 77 degrees F (22 degrees C) and 50% relative humidity per ASTM D 412.
    - b. Additional capability to withstand the following percentage increase and decrease of joint width as measured at time of application and remain in compliance with other requirements of ASTM C 920 - 40%.
- B. Acrylic Sealant: Manufacturer's standard one-part nonsag, solvent- release-curing, acrylic polymer sealant complying with ASTM C 920 for Type S; Grade NS; Class 24; except for selected test properties which are revised as follows:
  - 1. Heat-aged hardness: 40-50
  - 2. Weight loss: 15%
  - 3. Max. cyclic movement capability (Class): + or - 7-1/2%
- C. Sealant Backings, General: Non-staining; compatible with joint substrates, sealants, primers and other joint fillers; approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
  - 1. Plastic Foam Joint-Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated below, and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
    - a. Either flexible, open-cell polyurethane foam or non-gassing, closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer.
  - 2. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back (3rd) surface of joint.
- D. Primer: Type as recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer-substrate and field tests.

### **PART 3 - EXECUTION**

- A. General: Comply with joint sealer manufacturers' printed installation instruction applicable to products and applications indicated.
- B. Elastomeric Sealant Installation Standard: Comply with ASTM C 962.
  - 1. Seal all joints and material connections and transitions as required and in accordance with details provided.
  - 2. Seal all joints in Exterior Insulation and Finish System except ventilation weep holes.
- C. Latex Sealant Installation Standard: Comply with ASTM C 790.
  - 1. Seal all joints and material connections and transitions as required where paint is required and in accordance with details provided.

END OF SECTION 07900

## SECTION 08111 - STANDARD STEEL DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes standard hollow-metal steel doors and frames.

#### 1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, and finishes for each type of steel door and frame specified.
- B. Shop Drawings: Provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings.
- C. Product test reports.

#### 1.3 QUALITY ASSURANCE

- A. Fire-Rated Door and Sidelight Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.
  - 1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.
  - 2. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.
- B. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.
- C. Preinstallation Conference: Conduct conference at Project site.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Amweld Building Products, LLC.
2. Benchmark Doors; a division of General Products Co., Inc.
3. Ceco Door Products; an ASSA ABLOY Group Company.
4. CURRIES Company; an ASSA ABLOY Group Company.
5. Deansteel Manufacturing, Inc.
6. Fleming Door Products Ltd.; an ASSA ABLOY Group Company.
7. Kewanee Corporation (The).
8. Mesker Door Inc.
9. Pioneer Industries, Inc.
10. Republic Builders Products Company.
11. Steelcraft; an Ingersoll-Rand Company.
12. Manufacture approved by Architect.

## 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 (ZF180) zinc-iron-alloy (galvannealed) coating designation.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized.
- E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
- F. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.
- G. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. (96- to 192-kg/cu. m) density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Division 8 Section "Glazing."
- J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.3 STANDARD STEEL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces. Comply with ANSI A250.8.
  1. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.
  2. Vertical Edges for Single-Acting Doors: Beveled edge.

- a. Beveled Edge: 1/8 inch in 2 inches (3 mm in 50 mm).
- 3. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick end closures or channels of same material as face sheets.
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
  - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior door requirements. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
  - 1. Level 1 and Physical Performance Level C, (Standard Duty), Model 1 (Full Flush).

## 2.4 STANDARD STEEL FRAMES

- A. General: Comply with ANSI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
  - 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
  - 2. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
- C. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.
  - 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
  - 2. Frames for Level 1 Steel Doors: 0.042-inch- (1.0-mm-) thick steel sheet.
  - 3. Frames for Borrowed Lights: 0.042-inch- (1.0-mm-) thick steel sheet.
- D. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.
- E. Jamb Anchors: Masonry, stud-wall, compression, or postinstalled expansion type; not less than 0.042 inch (1.0 mm) thick.
- F. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick.
- G. Plaster Guards: Formed from same material as frames, not less than 0.016-inch (0.4-mm) thick.

## 2.5 STOPS AND MOLDINGS

- A. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5/8 inch (16 mm) high, unless otherwise indicated.

## 2.6 FABRICATION

- A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper

assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Standard Steel Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Grilles/Louvers: Factory cut openings in doors and factory installed.

C. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints; fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
4. Plaster Guards: Weld guards to frame at back of hardware mortises in frames installed in concrete or masonry.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c.
7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

D. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Provide fixed stops and moldings welded on secure side of door or frame.
2. Provide loose stops and moldings on inside of doors and frames.

## 2.7 FINISHES

A. Steel Finish: Factory priming for field-painted finish.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Remove welded-in shipping spreaders installed at factory.



- B. Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- C. Standard Steel Frames: Install standard steel frames for doors, sidelights, borrowed lights and other openings, of size and profile indicated. Comply with SDI 105.
  - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-protection-rated openings, install frames according to NFPA 80.
    - b. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.
  - 2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
  - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."
  - 4. Concrete Walls: Solidly fill space between frames and concrete with grout. Install grout in lifts and take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
- D. Standard Steel Doors: Fit hollow-metal doors accurately in frames. Shim as necessary.
  - 1. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  - 2. Smoke-Control Doors: Install doors according to NFPA 105.
- E. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.
- F. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

END OF SECTION 08111

## SECTION 08211 - FLUSH WOOD DOORS

### 1.1 GENERAL

- A. Submittals: In addition to Product Data, submit the following:
  - 1. Shop Drawings: Indicate location, size, and hand of each door; fire ratings; construction details; location and extent of hardware blocking, mortises, holes, and cutouts; requirements for veneer matching and factory finishing; and other pertinent data.
  - 2. Samples of actual materials in small sections for each face material and finish.
- B. AWI Quality Standard: AWI's "Architectural Woodwork Quality Standards" for grade of door, core, construction, finish, and other requirements.
- C. Fire-Rated Wood Doors: Doors that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.

### 1.2 PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or as approved by the Architect in accordance with DIVISION 1:
  - 1. Algoma Hardwoods Inc.
  - 2. Ampco Products, Inc.
  - 3. Buell Door Co.
  - 4. Cal-Wood Door Div.; Timberland Ind., Inc.
  - 5. Eggers Industries; Architectural Door Division.
  - 6. Fenestra Corp.
  - 7. Glen-Mar Door Mfg. Co.
  - 8. Graham Manufacturing Corp.
  - 9. Vancouver Door Company, Inc.
  - 10. Weyerhaeuser Co.
- B. Doors for Transparent Finish: As follows:
  - 1. Grade: Custom (Grade A faces).
  - 2. Faces: Red oak, plain sliced.
  - 3. Match between Veneer Leaves: Pleasing match.
  - 4. Pair and Set Match: Provide for pairs of doors and for doors hung in adjacent sets.
- C. Interior Solid-Core Veneer-Faced Doors: As follows:
  - 1. Core: Particle board core.
  - 2. Construction: Seven plies with minimum 2" stiles and rails bonded to core, then entire unit abrasive planed before veneering.
- D. Fire-Rated Doors: As follows:
  - 1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as required to provide fire rating indicated.
  - 2. Edge Construction: Manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance.
  - 3. Pairs: Furnish formed-steel edges and astragals for pairs of fire-rated doors, unless otherwise indicated.
  - 4. Pairs: Provide fire-rated pairs with fire-retardant stiles that are labeled and listed for kinds of applications indicated without formed-steel edges and astragals.
- E. Blocking: Provide blocking for Particle board-core doors as necessary to eliminate need for through-bolting hardware.

- F. Fabricate flush wood doors in sizes indicated for Project site fitting.
- G. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Louvers: Factory install louvers in prepared openings.
- H. Shop seal faces and edges of doors for transparent finish with stain (if required), other required pretreatments, and first coat of finish as specified in Division 9 Section "Painting."

### 1.3 EXECUTION

- A. Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
  - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- B. Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.

END OF SECTION 08211

## **SECTION 08305 - ACCESS DOORS**

### **1.1 GENERAL**

- A. Submittals: In addition to product data, submit the following:
  - 1. Access door schedule including types, general locations, sizes, wall and ceiling details, latching or locking provisions, and other pertinent installation data.
  - 2. Shop drawings showing fabrication and installation of customized access doors and frames.
- B. Quality Assurance: Provide fire-rated access doors that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per test method as indicated below, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Test Method for Vertical Installations: ASTM E 152.
  - 2. Test Method for Horizontal Installations: ASTM E 119.

### **1.2 PRODUCTS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Acudor Products Inc.
  - 2. Bar-Co, Inc. Div., Alfab, Inc.
  - 3. Cesco Products.
  - 4. Elmdor Manufacturing Co.
  - 5. J.L. Industries.
  - 6. Karp Associates, Inc.
  - 7. Larsen's Manufacturing Co.
  - 8. Milcor, Inc.
  - 9. Nystrom, Inc.
  - 10. The Williams Bros. Corporation of America.
- B. Steel Sheet: ASTM A 366/A 366M commercial-quality, cold-rolled steel sheet with baked-on, rust-inhibitive primer.
- C. Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Electrolytic zinc-coated steel sheet with Class C coating and phosphate treatment to prepare surface for painting.
- D. Insulated, Fire-Rated Access Doors: Self-latching units consisting of frame, trim, door, insulation, and hardware, including automatic closer, interior latch release, and complying with the following requirements:
  - 1. Fire-Protection Rating for Walls: 1-1/2 hours.
  - 2. Fire-Protection Rating for Ceilings: 3 hours for combustible assemblies.
- E. Trimless, Flush Access Doors for Gypsum Board: Units consisting of frame, concealed edge trim, door, hardware, and complying with the following requirements:
  - 1. Hinge: Continuous type.
  - 2. Latches: Bolt type, operated by either a ring turn or flush key device (keyed alike).
  - 3. Locks: Key-operated cylinder lock.

### **1.3 EXECUTION**

- A. Preparation: Advise Installers of other work about specific requirements relating to access door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices. Furnish inserts and anchoring devices for access doors that must be built into other construction. Coordinate delivery with other work to avoid delay.

- B. Installation: Comply with manufacturer's instructions for installing access doors. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finished surfaces. Install concealed-frame access doors flush with adjacent finish surfaces.
- C. Adjust and clean hardware and panels after installation for proper operation.
- D. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08305

## SECTION 08711 - FINISH HARDWARE

### 1.1 GENERAL

- A. Acceptable Manufacturers/Products: Acceptable manufacturers for various types of products are listed below. An asterisk (\*) following a manufacturer's name designates manufacturer whose products are indicated in Finish Hardware Schedule. Such products are listed in the schedule by specific reference to manufacturers catalog numbers. Except as otherwise indicated, products of equivalent quality, design and function by other listed manufacturers may be used, subject to approval of Architect.
- B. Submit final hardware schedule organized by "hardware sets", to indicate specifically the product to be furnished for each item required on each door.
  - 1. Furnish templates to each fabricator of doors and frames, as required for preparation to receive hardware.
- C. Provide full information on all specific hardware items including, installation information, security requirements, and power or other utility requirements. General contractor is responsible to coordinate all required trades for complete installation.
- D. For fire-rated openings provide hardware tested and listed by UL or FM (NFPA Standard 80). On panic exit devices, provide UL or FM label indicating "Fire Exit Hardware".
- E. Submit samples of hardware items, showing each required finish from each manufacturer (for acceptance of color and texture only).
- F. Comply with all requirements of the Americans with Disabilities Act requirements for all door hardware.

### 1.2 PRODUCTS

- A. Finish and base material designations are indicated in accordance with ANSI A156.18 or the nearest traditional U.S. commercial finish. Finish shall match the existing building hardware finish.
- B. Hinges and Pivots:
  - 1. Mfrs. of Butts: McKinney, Hager, Stanley.
  - 2. Mfrs. of Pivots: Jackson Exit Device, LCN, Norton, Rixson- Firemark, Russwin, Stanley.
  - 3. Provide full-mortise type hinges on each door, except as otherwise indicated, and except as otherwise needed for proper support and operation of doors.
    - a. Provide stainless steel pins, except steel pins with steel hinges; non-removable for exterior and public interior exposure, non-rising for non-security exposure, flat button with matching plugs.
    - b. Ball-bearing Function: Swaged, inner leaf beveled, square corners.
    - c. Plain-bearing Function: Swaged, inner leaf beveled, rounded corners; except provide ball-bearing for doors equipped with closers.
- C. Locks, Latches and Bolts:
  - 1. Mfrs. of Lock/Latch Sets, Including Cylinders: Match existing lock and keying system.
  - 2. Mfrs. of Exit Devices: Sargent, Von Duprin.
  - 3. Mfrs. of Door Bolts: Quality, Ives, Russwin, Sargent, Stanley.
  - 4. Strikes: Wrought box strikes, with extended lip for latch bolts. Provide dust-proof strikes for foot bolts.
  - 5. Equip exit devices with dogging devices where door has closer, except when door is fire-rated.
- D. Locks: Equip lock sets with 6-pin tumbler type lock cylinders, in a masterkey system, to be

designated by Owner.

1. Construction Locks: Either temporary cylinders for construction period, or temporary construction keying which is automatically voided through use of Owner's keys.
2. Provide 3 change keys for each lock, plus 5 masterkeys for each master key system. Stamp keys "DO NOT DUPLICATE".
3. Provide key control system, including metal cabinet with 150% capacity, envelopes, labels, tags, clips, forms, card index and markers; standard system with keys installed and index prepared by key control manufacturer.

E. Push/Pull Units:

1. Mfrs. of Push/Pull Units: Quality, Builders Brass Works, Russwin, Triangle Brass.

F. Door Control Devices:

1. Mfrs. of Closers: LCN, Sargent.
2. Mfrs. of Holders, Stops, Bumpers: Quality, Builders Brass Works, Corbin, Sargent or Stanley.
3. Provide grey rubber exposed resilient parts.

G. Finish exposed metal to match hardware, except finish floor plates to match thresholds.

1. Provide recessed plates, wherever possible, to receive insert of floor finish.

H. Size and mount units indicated or, if not indicated, to comply with mfr.'s recommendations for the exposure condition. Reinforce the substrate as recommended.

1. Where parallel-arm closers are indicated, provide units one size larger than recommended for standard-arm units.

I. Silencers: Provide silencers in metal door frames, unless not permitted for fire rating, or unless bumper-type weatherstripping is provided; 3 per single-door frame, 4 per double-door frame.

J. Coordinators: Provide coordinator device for pairs of doors with closers, wherever there is the possibility of leaves closing in wrong sequence.

K. Miscellaneous Door Hardware:

1. Mfrs. of Miscellaneous Hardware: Provide plates, trim, viewers, and similar units as indicated, produced by Quality\*, Baldwin, Builders Brass Works or Ives.
2. Fabricate plates and edge trim units 1/16" to 1/2" smaller than actual door dimension. Install with self-tapping screws.
  - a. Provide .050" thick (18 ga.) steel with beveled edges for kick plates, armor plates, and edge protection stripping. Finish to match all other hardware.

L. Weatherstripping:

1. Mfrs. of Weatherstripping: Pemko, Reese.
2. Provide manufacturer's standard weatherstripping of type, size and profile indicated, continuous at head and jamb edges of each exterior door opening. Provide non-corrosive fasteners.

M. Thresholds: Comply with ADA requirements.

1. Mfrs. of Thresholds: Pemko\*, Reese.
2. Provide extruded aluminum threshold of type, design and profile indicated, complete with replaceable resilient vinyl wiper-type insert. Provide non-corrosive fasteners.

### 1.3 EXECUTION

- A. Hardware Mounting Heights: Door and Hardware Institute "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames", and current ADA requirements.
- B. Install each hardware item to comply with manufacturer's instructions and recommendations.
- C. Set thresholds where required for interior and exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant. Remove excess sealant and clean adjacent surfaces.
- D. Hardware Adjustment: Return to project one month after Owner's occupancy, and adjust hardware for proper operation and function. Instruct Owner's personnel in proper maintenance and adjustment.

#### HARDWARE GROUPS:

**NOTE: MATCH EXISTING FINISH**

##### HW 1

1.5 PAIR	BUTTS	BB5000 4.5 X 4.5	BOMMER
1 EACH	EXIT	98L F X IC CYL	VON DUPRIN
1 EACH	CLOSER	P4041 EDA	LCN
1 EACH	KICKPLATE	10" X 2" LDW	QUALITY
1 EACH	STOP	307	QUALITY
1 EACH	SMOKE SEAL	2525	NG

##### HW 2

1.5 PAIR	BUTTS	BB5000 4.5 X 4.5	BOMMER
1 EACH	LOCKSET	93K7 AB 15C	BEST
1 EACH	STOP	302	QUALITY
1 EACH	SMOKE SEAL	2525	NG

**NOTE ALL LOCKS SHALL BE BEST LOCKS**

**NOTE: CARD READERS ARE REQUIRED AND SHALL BE PROVIDED AND INSTALLED BY OWNER. PREPARATION FOR AND INSTALLATION COORDINATION SHALL BE PROVIDED BY THE CONTRACTOR.**

END OF SECTION 08711



## SECTION 09255 - GYPSUM BOARD ASSEMBLIES

### 1.1 GENERAL

- A. Work included in this section:
  - 1. Gypsum Drywall
  - 2. Metal Support and Partition Systems
- B. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies that are identical to assemblies tested for fire resistance according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

### 1.2 PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Steel Framing and Furring:
    - a. Clark Steel Framing, Inc.
    - b. Consolidated Systems, Inc.
    - c. Dale Industries, Inc.
    - d. Dietrich Industries, Inc.
    - e. Marino/Ware (formerly Marino Industries Corp.).
    - f. National Gypsum Co.; Gold Bond Building Products Division.
    - g. Unimast, Inc.
  - 2. Grid Suspension Assemblies:
    - a. Armstrong World Industries, Inc.
    - b. Chicago Metallic Corp.
    - c. USG Interiors, Inc.
    - d. Worthington Steel Company (formerly National Rolling Mills).
  - 3. Gypsum Board and Related Products:
    - a. Domtar Gypsum.
    - b. Georgia-Pacific Corp.
    - c. National Gypsum Co.; Gold Bond Building Products Division.
    - d. United States Gypsum Co.
- B. Steel Framing Components for Suspended and Furred Ceilings: Provide components complying with ASTM C 754 for conditions indicated.
  - 1. Wire Ties: **ASTM A 641 (ASTM A 641M)**, Class 1 zinc coating, soft temper, **0.062 inch (1.6 mm)** thick.2. Hanger Wires and Rods: Mild steel and zinc coated or protected with rust-inhibitive paint. Size conforming with UBC requirements, not less than 0.145 inch (4.19 mm) (10 gage) for suspension wires.
  - 2. Channels: Cold-rolled steel, **0.0598-inch (1.5-mm)** minimum thickness of base metal and **7/16-inch- (11.1-mm-)** wide flanges, and as follows:
    - a. Carrying Channels: **2 inches (50.8 mm)** deep, **590 lb/1000 feet (88 kg/100 m)**, unless otherwise indicated.

- b. Furring Channels: **3/4 inch (19.1 mm)** deep, **300 lb/1000 feet (45 kg/100 m)**, unless otherwise indicated.
  - c. Finish: **ASTM A 653, G 60 (ASTM A 653M, Z 180)** hot-dip galvanized coating for framing for exterior soffits and where indicated.
- 3. Steel Studs for Furring Channels: ASTM C 645, 3.5 inches min depth unless otherwise indicated and with **0.0179-inch (0.45-mm)**(26 gage) minimum base metal thickness, unless otherwise indicated.
  - a. Protective Coating: **ASTM A 653, G 40 (ASTM A 653M, Z 90)** hot-dip galvanized coating for framing for exterior soffits and ceiling suspension members in areas within **10 feet (3 m)** of exterior walls.
  - b. Provide minimum 2" X 6" solid blocking for installation of wall mounted equipment, fixtures and/or devices. Blocking requirements shall be coordinated with requirements of other Sections.
- 4. Steel Resilient Furring Channels: Standard product fabricated from steel sheet complying with **ASTM A 653 (ASTM A 653M)** or **ASTM A 568 (ASTM A 568M)** to form **2-inch-(12.7-mm-)** deep channel of the following configuration:
  - a. Double-Leg Configuration: Hat-shaped channel with **1-1/2-inch- (38.1-mm-)** wide face connected to flanges by double-slotted or expanded-metal legs (webs).
- 5. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung system conforming with UBC requirements for size.
- C. Steel Framing for Walls and Partitions: Provide steel framing members complying with the following requirements:
  - 1. Protective Coating: **ASTM A 653, G 40 (ASTM A 653M, Z 90)** hot-dip galvanized coating for framing members attached to and within **10 feet (3 m)** of exterior walls.2. Steel Studs and Runners: ASTM C 645, in depth indicated and with **0.0179-inch (0.45-mm)** (Minimum 26 gage) base metal thickness, unless otherwise indicated.
    - a. Provide **0.0329-inch (0.84-mm)** minimum base metal thickness for head runner, sill runner, jamb, and cripple studs at door and other openings.
    - b. Provide **0.0329-inch (0.84-mm)** minimum base metal thickness in locations to receive cementitious backer units.
  - 2. Steel Resilient Furring Channels: Manufacturer's standard product fabricated from steel sheet complying with **ASTM A 653 (ASTM A 653M)** or **ASTM A 568 (ASTM A 568M)** to form 2 1/2 inch "Z" type units.
- D. Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.
- E. Gypsum Board Products: Types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.
  - 1. Gypsum Wallboard: ASTM C 36, 5/8 inch thickness unless otherwise indicated.
    - a. Type: Type X for fire-resistance-rated assemblies
    - b. Edges: Tapered.
- F. Sound Deadening Board: 5/8 inch thickness unless otherwise indicated.
- I. Joint Treatment Materials: Provide joint treatment materials complying with ASTM C 475 and the

recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

1. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.
  2. Joint Tape for Cementitious Backer Units and Exterior Water-Resistant Backing Board: As recommended by cementitious backer unit manufacturer.
  3. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
    - a. For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer.
    - b. For filling joints and treating fasteners of backing board behind base for ceramic tile, use formulation recommended by gypsum board manufacturer.
    - c. For topping compound, use sandable formulation.
  4. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
    - a. Ready-Mixed Formulation: Factory-mixed product.
      - 1) All-purpose compound formulated for both taping and topping compounds.
  5. Joint Compound for Cementitious Backer Units: Material recommended by cementitious backer unit manufacturer.
- G. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- H. Miscellaneous Materials: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.
1. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from **0.033 to 0.112 inch (0.84 to 2.84 mm)** thick.
  2. Steel drill screws of size and type recommended by unit manufacturer for fastening cementitious backer units.
  3. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
  4. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation to comply with ASTM C 665 for Type I.
  5. Thermal Insulation: See Section 07210.

### 1.3 EXECUTION

- A. Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.
1. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
  2. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.
    - a. Where building structure abuts ceiling perimeter or penetrates ceiling.
    - b. Where partition framing and wall furring abut structure, except at floor.
  3. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

B. Installing Steel Framing for Suspended and Furred Ceilings: As follows:

1. Sway-brace suspended steel framing with hangers used for support.
2. Install suspended steel framing components in sizes and at spacings indicated, but not less than that required by the referenced steel framing installation standard.
3. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
4. For exterior soffits, install cross-bracing and additional framing to resist wind uplift.
4. Installing Steel Framing for Walls and Partitions: Install steel studs and furring at spacing of 16 inches on-center unless otherwise indicated.
5. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.
6. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
7. Cut studs 2 inch (51 mm) short of full height to provide perimeter relief.
8. For STC-rated and fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.
9. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated.
10. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.
11. Install thermal insulation as indicated and to comply with requirements of manufacturer's directions.

C. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

1. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
2. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
3. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches (813 mm) wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.
4. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.
5. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 2-inch- (6.4- to 50.8-mm-) wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
6. Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies.
7. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.
8. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.
9. Install cementitious backer units to comply with ANSI A108.11 and manufacturer's installation

- instructions.
10. Install water-resistant gypsum backing board panels where indicated. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or penetrations.
  11. Acoustical Tile Base: Where gypsum panels form the base for adhesively applied acoustical tile, install gypsum wallboard panels with tapered edges taped and finished to produce a flat surface.
  12. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:
    - a. Fasten with screws.
- D. Installing Trim Accessories: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.
1. Install cornerbead at external corners.
  2. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.
    - a. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
    - b. Install U-bead where indicated.
    - c. Install control joints according to ASTM C 840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.
- E. Finishing Gypsum Board Assemblies: Treat gypsum board joints, interior angles, flanges of cornerbead, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration.
1. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.
  2. Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.
  3. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
    - a. Level 4 for gypsum board surfaces, unless otherwise indicated.
  4. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.
  5. Finish water-resistant gypsum backing board to comply with ASTM C 840 and gypsum board manufacturer's directions.
  6. Finish cementitious backer units to comply with unit manufacturer's directions.

END OF SECTION 09255

## SECTION 09511 - ACOUSTICAL PANEL CEILINGS

### 1.1 GENERAL

- A. Submittals: In addition to Product Data for each type of acoustical panel and suspension system required, submit the following:
  - 1. ~~6-inch-~~ (150-mm-) square samples of each acoustical panel type, pattern, and color.
  - 2. Set of ~~12-inch-~~ (300-mm-) long samples of exposed suspension system members, including moldings, for each color and system type required.
- B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
  - 1. Fire-response tests were performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction and that performs testing and follow-up services.
  - 2. Surface-burning characteristics of acoustical panels comply with ASTM E 1264 for Class A materials (25 or less for flame spread, 50 or less for smoke developed) as determined by testing identical products per ASTM E 84.
  - 3. Products are identified with appropriate markings of applicable testing and inspecting agency.
- C. Comply with requirements of 2003 edition of the International Building Code (IBC).

### 1.2 PRODUCTS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated for each designation in the Acoustical Panel Ceiling Schedule.
- B. Acoustical Panels: Manufacturer's standard panels complying with ASTM E 1264 classifications, unless otherwise indicated, and with requirements indicated in the Acoustical Panel Ceiling Schedule.
  - 1. Mounting Method for Measuring Noise Reduction Coefficient: Type E-400 per ASTM E 795.
- C. Metal Suspension System: Manufacturer's standard direct-hung suspension system complying with applicable ASTM C 635 requirements and with requirements indicated in the Acoustical Panel Ceiling Schedule.
- D. Finishes and Colors for Metal Suspension System, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- E. Suspension System Attachment Devices: Fabricated from corrosion-resistant materials and sized for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
  - 1. Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
- F. Wire Hangers, Braces, and Ties: Zinc-coated, carbon-steel wire complying with ASTM A 641/A 641M, Class 1 zinc coating, soft temper. Size wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than ~~0.135-inch-~~ (3.5-mm-) (10 gage) diameter wire.
- G. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension

systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

### 1.3 EXECUTION

- A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and Cisca's "Ceiling Systems Handbook."
  - 1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.2.
  - Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
  - 3. U.B.C.'s "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings": U.B.C. Standard 25-2.
- B. Secure ceiling hangers from suspension system members to building's structural members. Install hangers plumb and free from contact with other objects within ceiling plenum. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 1. Do not support ceilings directly from permanent metal forms, or floor or roof deck. Do not attach hangers to steel deck tabs.
  - 2. Space hangers not more than **48 inches (1200 mm)** o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than **8 inches (200 mm)** from ends of each member.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
- F. ACOUSTICAL PANEL CEILING SCHEDULE:
  - 1. Mineral Composition Panels - Nodulated, Cast or Molded; with Standard Washable Painted Finish and Fissured Pattern.
    - a. Color/Light Reflectance: White/LR 1 (75% and over)
    - b. Grade: NRC 55
    - c. STC Range: 30-34
    - d. Edge Detail: Square
    - e. Size: 24" x 24" and 2' x 4' x 5/8" Thick
  - 2. Manufacturers:
    - a. Armstrong World Industries, Inc.
    - b. Celotex Corp
    - c. USG Acoustical Products Co

END OF SECTION 09511



## SECTION 09653 - RESILIENT WALL BASE AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Wall base – Black to match UTANG standards for Draper.
  - 2. Molding accessories.

#### 1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than **12 inches (300 mm)** long, of each resilient product color, texture, and pattern required.

#### 1.3 PROJECT CONDITIONS

- A. Maintain temperatures within range recommended by manufacturer, but not less than **70 deg F (21 deg C)** or more than **95 deg F (35 deg C)**, in spaces to receive floor tile during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **95 deg F (35 deg C)**.
- C. Install resilient products after other finishing operations, including painting, have been completed.

#### 1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Furnish not less than **10 linear feet (3 linear m)** for every **500 linear feet (150 linear m)** or fraction thereof, of each type, color, pattern, and size of resilient product installed.



## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

### 2.2 COLORS AND PATTERNS

- A. Colors and Patterns: **As selected from manufacturer's full range.**

### 2.3 RESILIENT WALL BASE

- A. Wall Base: ASTM F 1861.
  - 1. Armstrong World Industries, Inc.
  - 2. Azrock Commercial Flooring, DOMCO.
  - 3. Burke Mercer Flooring Products.
  - 4. Johnsonite.
  - 5. Marley Flexco (USA), Inc.
  - 6. Roppe Corporation.
  - 7. VPI, LLC, Floor Products Division.
- B. Type (Material Requirement): **TS (rubber, vulcanized thermoset).**
- C. Group (Manufacturing Method): **I (solid, homogeneous) or II (layered).**
- D. Style: **Cove (with top-set toe).**
- E. Minimum Thickness: **0.125 inch (3.2 mm).**
- F. Height: **4 inches (102 mm) or 6 inches (152 mm) in toilet rooms.**
- G. Lengths: **Coils in manufacturer's standard length.**
- H. Outside Corners: **Premolded.**
- I. Inside Corners: **Premolded.**
- J. Surface: Smooth.

### 2.4 RESILIENT MOLDING ACCESSORY

- A. Description: **Reducer strip for resilient floor covering.**
  - 1. Burke Mercer Flooring Products.
  - 2. Johnsonite.
  - 3. Marley Flexco (USA), Inc..

- 4. Roppe Corporation.
- B. Material: **Rubber**.
- C. Profile and Dimensions: Minimum 1-inch.

## 2.5 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturers for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.
- B. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- C. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- D. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
  - 1. Do not install resilient products until they are the same temperature as the space where they are to be installed.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 RESILIENT WALL BASE INSTALLATION

- A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. Do not stretch wall base during installation.

- E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.
- F. Premolded Corners: Install premolded corners before installing straight pieces.

### 3.3 RESILIENT ACCESSORY INSTALLATION

- A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing resilient product installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.
    - a. Do not wash surfaces until after time period recommended by manufacturer.
- B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

END OF SECTION 09653

## SECTION 09680 - CARPET

### 1.1 GENERAL

- A. Submittals: As follows:
  - 1. Shop Drawings showing carpet type, color, and dye lot; locations where dye lot changes occur; seam locations, types, and methods; type of subfloor; type of installation; pattern type, repeat size, location, direction, and starting point; and type of cushion.
- B. Comply with CRI 104, Section 5, "Storage and Handling," and Section 6.1, "Site Conditions; Temperature and Humidity."
- C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet manufacturer.
- D. Extra Materials: Furnish full-width rolls equal to 5 percent of amount installed for each type of carpet indicated, but not less than **10 sq. yd. (8.3 sq. m)**.

### 1.2 PRODUCTS

- A. The contractor shall purchase, receive, unload, store, prepare for and lay all carpet.
- B. The following product shall be the same material specified in the state carpet contract.
  - 1. Color and Pattern: As selected by Architect from manufacturer=s full range
  - 2. Carpet Manufacturer (Mill):
- C.. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by carpet manufacturer.
- D. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by carpet manufacturer.
- E. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

### 1.3 EXECUTION

- A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.
  - 1. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and slabs are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet manufacturer.
- B. Preparation: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.
- C. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- D. Remove coatings, including curing compounds, and other substances that are incompatible with

adhesives and that contain soap, wax, oil, or silicone, without using solvents.

- E. Direct-Glue-Down Installation: Comply with CRI 104, Section 8, "Direct Glue-Down Installation."
- F. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- G. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- H. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- I. Perform the following operations immediately after installing carpet:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
  - 2. Remove yarns that protrude from carpet surface.
  - 3. Vacuum carpet using commercial machine with face-beater element.
- J. Protect installed carpet to comply with CRI 104, Section 15, "Protection of Indoor Installations."

END OF SECTION 09680

## SECTION 09912 - PAINTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes surface preparation and field painting of exposed interior items and surfaces.

#### 1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Samples: For each type of finish-coat material indicated.

#### 1.3 QUALITY ASSURANCE

- A. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5.
  - 1. Wall Surfaces: Provide samples on at least 50 sq. ft. (5 sq. m).
  - 2. Small Areas and Items: Architect will designate items or areas required.
  - 3. Final approval of colors will be from benchmark samples.

#### 1.4 PROJECT CONDITIONS

- A. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.
- B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C).
- C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F (7 and 35 deg C).
- D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

#### 1.5 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
  - 1. Quantity: 3 percent, but not less than 1 gal. (3.8 L) or 1 case, as appropriate, of each material and color applied.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
  - 1. ICI Dulux Paint Centers (ICI Dulux Paints).
  - 2. PPG Industries, Inc. (Pittsburgh Paints).
  - 3. Sherwin-Williams Co. (Sherwin-Williams).
  - 4. Manufacturer's approval by Architect prior to bidding.

### 2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Colors: As selected from manufacturer's full range.

### 2.3 PREPARATORY COATS

- A. Concrete Unit Masonry Block Filler: High-performance latex block filler of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
- B. Interior Primer: Interior latex-based or alkyd primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
  - 1. Ferrous-Metal Substrates: Quick drying, rust-inhibitive metal primer.
  - 2. Zinc-Coated Metal Substrates: Galvanized metal primer.
  - 3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

### 2.4 INTERIOR FINISH COATS

- A. Interior Semigloss Acrylic Enamel: - Metal Doors & Door Frames
  - 1. ICI Dulux Paints; 1406-XXXX Dulux Professional Acrylic Semi-Gloss Interior Wall & Trim Enamel.
  - 2. Pittsburgh Paints; 6-500 Series SpeedHide Interior Semi-Gloss Latex.
  - 3. Sherwin-Williams; ProMar 200 Interior Latex Semi-Gloss Enamel B31W200 Series.
- B. Interior Semigloss Alkyd Enamel: - Gypsum wallboard, masonry, wood and all other areas.
  - 1. ICI Dulux Paints; 1516-XXXX Ultra-Hide Alkyd Semi-Gloss Interior Wall & Trim Enamel.
  - 2. Pittsburgh Paints; 6-1110 Series SpeedHide Interior Enamel Wall & Trim Semi-Gloss Oil.
  - 3. Sherwin-Williams; ProMar 200 Interior Alkyd Semi-Gloss Enamel B34W200 Series.

## 2.5 INTERIOR WOOD STAINS AND VARNISHES

- A. Open-Grain Wood Filler:
  - 1. ICI Dulux Paints; none required.
  - 2. Pittsburgh Paints; none required.
  - 3. Sherwin-Williams; Sher-Wood Fast-Dry Filler.
  - 4. Sherwin-Williams; none recommended.
- B. Interior Wood Stain: Alkyd based.
  - 1. ICI Dulux Paints; 1700-XXX WoodPride Interior Solventborne Wood Finishing Stain.
  - 2. Pittsburgh Paints; 77-560 Rez Interior Semi-Transparent Oil Stain.
  - 3. Sherwin-Williams; Wood Classics Interior Oil Stain A-48 Series.
- C. Clear Sanding Sealer: Fast-drying alkyd based.
  - 1. ICI Dulux Paints; 1902-0000 WoodPride Interior Satin Polyurethane Varnish.
  - 2. Pittsburgh Paints; 6-10 SpeedHide Quick-Drying Interior Sanding Wood Sealer and Finish.
  - 3. Sherwin-Williams; Wood Classics Fast Dry Sanding Sealer B26V43.
- D. Interior Alkyd- or Polyurethane-Based Clear Satin Varnish:
  - 1. ICI Dulux Paints; 1902-0000 WoodPride Interior Satin Polyurethane Varnish.
  - 2. Pittsburgh Paints; 77-7 Rez Varnish, Interior Satin Oil Clear.
  - 3. Sherwin-Williams; Wood Classics Fast Dry Oil Varnish, Satin A66-300 Series.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
- C. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- D. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
  - 1. Provide barrier coats over incompatible primers or remove and reprime.
  - 2. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
  - 3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
    - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming,



- fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
    - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
    - c. If transparent finish is required, backprime with spar varnish.
    - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
    - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
  - 4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
    - a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
    - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
    - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
  - 5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- E. Material Preparation:
- 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
  - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
- F. Exposed Surfaces: Include areas visible when permanent or built-in fixtures, grilles, convactor covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
- 1. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 2. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
  - 3. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  - 4. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
  - 5. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
- G. Sand lightly between each succeeding enamel or varnish coat.
- H. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
- 1. Omit primer over metal surfaces that have been shop primed and touchup painted.
  - 2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.

- I. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
- J. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.
- K. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- L. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- M. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- N. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- O. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
- P. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

### 3.2 CLEANING AND PROTECTING

- A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
- B. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- C. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
  - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

### 3.3 INTERIOR PAINT SCHEDULE

- A. Concrete and Masonry (Other Than Concrete Unit Masonry):
  - 1. Alkyd Finish: Two finish coats over a primer.
    - a. Primer: Interior concrete and masonry primer.
    - b. Finish Coats: Interior semigloss acrylic enamel.
- B. Gypsum Board:

1. Alkyd Finish: Two finish coats over a primer.
  - a. Primer: Interior gypsum board primer.
  - b. Finish Coats: Interior semigloss acrylic enamel.

C. Wood:

1. Alkyd-Enamel Finish: Two finish coats over a primer.
  - a. Primer: Interior wood primer for acrylic-enamel and semigloss alkyd-enamel finishes.
  - b. Finish Coats: Interior semigloss acrylic enamel.

D. Ferrous Metal:

1. Acrylic-Enamel Finish: Two finish coats over a primer.
  - a. Primer: Interior ferrous-metal primer.
  - b. Finish Coats: Interior semigloss alkyd enamel.

E. Zinc-Coated Metal:

1. Acrylic-Enamel Finish: Two finish coats over a primer.
  - a. Primer: Interior zinc-coated metal primer.
  - b. Finish Coats: Interior semigloss alkyd enamel.

F. All-Service Jacket over Insulation:

1. Alkyd Finish: Two finish coats. Add fungicidal agent to render fabric mildew proof.
  - a. Finish Coats: Interior flat latex-emulsion size.

### 3.4 INTERIOR STAIN AND NATURAL-FINISH WOODWORK SCHEDULE

- A. Stain-Varnish Finish: Three finish coats of varnish over a sealer coat and interior wood stain. Wipe wood filler before applying stain.
  1. Filler Coat: Open-grain wood filler.
  2. Stain Coat: Interior wood stain.
  3. Sealer Coat: Clear sanding sealer.
  4. Finish Coats: Interior alkyd- or polyurethane-based clear satin varnish.

END OF SECTION 09912

## SECTION 10520 - FIRE-PROTECTION SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. This Section includes the following:

1. To be provided by Owner.
2. Fire-protection cabinets.
3. Fire-protection cabinets.

#### 1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Fire-Protection Cabinets: Include door hardware, cabinet type, trim style, panel style, and details of installation.

B. Samples: For each exposed cabinet finish.

C. Maintenance data.

#### 1.3 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

C. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

#### 1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Apply decals on field-painted fire-protection cabinets after painting is complete.

#### 1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

- a. Failure of hydrostatic test according to NFPA 10.
  - b. Faulty operation of valves or release levers.
2. Warranty Period: Six years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

### 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
  1. Sheet: **ASTM B 209** (**ASTM B 209M**).
  2. Extruded Shapes: **ASTM B 221** (**ASTM B 221M**).
- C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

### 2.3 FIRE-PROTECTION CABINET

- A. Available Manufacturers:
  1. Fire End & Croker Corporation.
  2. General Accessory Mfg. Co.
  3. JL Industries, Inc.
  4. Kidde Fynetics.
  5. Larsen's Manufacturing Company.
  6. Modern Metal Products; Div. of Technico.
  7. Moon American.
  8. Potter Roemer; Div. of Smith Industries, Inc.
  9. Watrous; Div. of American Specialties, Inc.
  10. Manufacturer approved by Architect.
- B. Cabinet Type: Suitable for fire extinguisher.
- C. Cabinet Construction: 1-hour fire rated.
- D. Cabinet Material Aluminum sheet.
- E. Semirecessed Cabinet: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Rolled-Edge Trim: 2-1/2-inch (64-mm)] [4-inch (102-mm) backbend depth.
- F. Cabinet Trim Material: Steel sheet.
- G. Door Material: Extruded-aluminum shapes.
- H. Door Style: Fully glazed panel with frame.
- I. Door Glazing: Tempered break glass.
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
1. Provide manufacturer's standard.
  2. Provide manufacturer's standard hinge permitting door to open 180 degrees.
- K. Accessories:
1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, with plated or baked-enamel finish.
  2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
  3. Door Lock: Cylinder lock, keyed alike to other cabinets.
  4. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
    - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
      - 1) Location: Applied to cabinet glazing].
      - 2) Application Process: Pressure-sensitive vinyl letters.
      - 3) Lettering Color: Black.
      - 4) Orientation: Vertical.
- L. Finishes:
1. Aluminum: Class I, color anodic coating complying with AAMA 611.
    - a. Color and Texture: Dark bronze.

## 2.4 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth.
1. Construct fire-rated cabinets with double walls fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick, fire-barrier material. Provide factory-drilled mounting holes.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
  2. Miter and weld perimeter door frames.

- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
- B. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.
- C. Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- D. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.
  - 1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire-protection cabinets.
  - 2. Provide inside latch and lock for break-glass panels.
  - 3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- E. Identification: Apply vinyl lettering at locations indicated.
- F. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- G. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair.

END OF SECTION 10520

## **SECTION 13500 - BALANCING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### **1.2 WORK INCLUDED:**

- A. The General Contractor shall employ an AABC or NEBB certified contractor to test and balance the HVAC systems.
- B. As a part of this contract, the mechanical contractor shall make all changes in the sheaves, belts, and dampers, including the addition of dampers required for correct balance as required by the TAB firm, at no additional cost to the Owner.

#### **1.3 SERVICES OF MECHANICAL CONTRACTOR:**

- A. The mechanical contractor shall have all systems complete, calibrated, and in operational readiness prior to notifying the TAB firm that the project is ready for their services, and the contractor shall so certify in writing to the Owner that such a condition exists.
- B. Should the TAB firm be so notified and the TAB work commenced and the systems are found to not be in readiness or a dispute occurs as to the readiness of the systems, the mechanical contractor shall request an inspection be made by a duly appointed representative of the Owner, TAB firm, and the mechanical contractor. This inspection shall establish to the satisfaction of the represented parties whether or not the systems meet the basic requirements for TAB services. Should the inspection reveal the TAB services notification to have been premature, all costs of the inspection and work previously accomplished by the TAB firm shall be paid for by the project mechanical contractor.

#### **1.4 SERVICES OF THE TAB FIRM:**

- A. Act as liaison between the Owner, Owner's Representative, and contractor and inspect the installation of mechanical piping systems, sheet metal work, temperature controls and other component parts of the heating, air conditioning and ventilating systems. The inspection of the work will cover that part relating to proper arrangement and adequate provisions for the checking and balancing.
- B. Upon completion of the installation and start-up of the mechanical equipment, to check, adjust, and balance system components to obtain optimum conditions on each conditional space in the building.
- C. Prepare and submit to the Owner (or his delegated representative) complete reports on the balance and operations of the systems.

### **PART 2 - PRODUCTS (Not Applicable)**

### **PART 3 - EXECUTION**

#### **3.1 TEMPERATURE TABULATION:**



- A. Take a temperature tabulation of all conditioned spaces on a room-by-room basis. Record outside ambient temperature. Record concurrent supply and return air temperatures at the HVAC unit.
- 3.2 AIR VOLUMES AND VELOCITIES:
- A. As measured at each supply grille, return air grille, and exhaust air grille or air handling device. It shall be the obligation of the contractor to furnish or revise fan drive and/or motors, if necessary, without cost to the Owner, to attain the specified air volumes.
- 3.3 AIR PRESSURE:
- A. As measured across each supply fan, cooling coil, heating coil, return air fan, air handling unit filter and exhaust fan. Relate these readings to the particular fan curve in terms of CFM.
- 3.4 ELECTRICAL CURRENT/VOLTAGE:
- A. Measurements to be taken at the drive motor on each piece of equipment.
- 3.5 FAN SPEED:
- A. To be measured in RPM. Measure fan speed in all pieces of HVAC equipment.
- 3.6 INSTRUMENTATION LIST:
- A. Provide a list of instruments by type and make used in gathering the TAB data.
- 3.7 DRAWINGS:
- A. The TAB contractor's working drawings shall have the supply air openings numbered and/or lettered to correspond to the numbers and letters used on the report data sheets so that data in the report can be correlated with each specific supply air opening in the building. If room numbers actually used in the building differ from those on the plans, the building room numbers shall be marked on these plans. Only one such marked-up set of drawings need be provided with the two copies of the TAB report.
- 3.8 LOGGING OF DATA
- A. The firm shall be responsible for inspecting, adjusting, balancing, and logging the data on the performance of fans, all dampers in the duct system, all air distribution devices, the flows of freon or water through all coils, and the power consumption of all motors. The contractor, mechanical contractor, the various subcontractors involved, and the suppliers of the equipment installed shall all cooperate with the balancing agency to provide all necessary data on the design and proper application of the system components and shall furnish all labor and material required to eliminate any deficiency.
- 3.9 EQUIPMENT:
- A. This contractor shall provide all necessary labor, equipment, scaffolding, instruments, and materials required to adjust, balance, and check all systems.
- 3.10 REPORT:
- A. The activities, as described hereinbefore, will culminate in a report to be provided to the Owner or his delegated representative. This report shall be furnished in four (4) copies. The

intent of the final report is to provide a reference of actual operating conditions for the Owner's operating personnel.

END OF SECTION 13500

## **SECTION 15010 - GENERAL PROVISIONS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### **1.2 GENERAL CONDITIONS:**

- A. The contractor shall carefully read the General Conditions of the Contract and all information to bidders which, with the following specifications for heating, cooling, plumbing, exhaust, ventilation, and temperature control are a part of the Contract.
- B. The Test and Balance Contractors shall submit their bids to the General Contractors.

#### **1.3 WORK INCLUDED:**

- A. The work to be done under this section includes the furnishing of all labor, materials, equipment, accessories required to complete all heating, air conditioning, ventilating, plumbing, and other mechanical systems as show on plans and described in these specifications or required to properly complete the entire work.

#### **1.4 CODES AND ORDINANCES:**

- A. The work shall be installed in accordance with the following codes: 2003 IBC, 2003 IMC, 2003 IPC, 2002 NEC, 90.1 Energy Code, Utah Pressure Vessel code, and any other state, local or government code or ordinance that governs the type of work covered by these specifications. Should the drawings conflict with the code, the code shall govern the proper installation of the work, and no extra charge shall be made for such change.

#### **1.5 SUBSTITUTIONS AND PACKAGE PRICING:**

- A. No substitutions or prior approvals are allowed for mechanical equipment. Suppliers who group products into packages for package pricing must breakout individual prices at the request of the contractor, engineer, or owner. Suppliers who refuse to breakout prices, especially those who may have a sole-source item, will not be allowed to submit prices to the contractors, and the engineer will issue an addendum to omit their products from the project.

#### **1.6 FEES AND PERMITS:**

- A. This contractor shall obtain all necessary permits and pay all fees required in connection with the work.

#### **1.7 SITE INSPECTION AND EXAMINATION OF DRAWINGS:**

- A. The contractor shall carefully study all drawings and specifications pertaining to the work. If any of the work as laid out, indicated, or specified is contrary or conflicts with any governing ordinances or regulations, the same shall be reported to the Owner's representative before submitting a bid. The Owner's representative will then issue instructions as to procedure. The contractor shall carefully examine the building site and compare the drawings with existing conditions. By the act of submitting a bid, the contractor shall be deemed to have made such examination, and to have accepted such conditions, and to have made allowance therefore in preparing his bid.

1.8 RECORD DRAWINGS:

- A. The contractor shall provide and keep up to date a complete record set of project drawings which shall be corrected daily to show change from the original drawings and specifications, the size and kind of equipment, and runs of all pipes, etc. Prints for this purpose will be furnished by the Owner's Representative. This set of drawings shall be kept on the work and shall be used only as record set. Upon completion of the work, the set of record drawings shall be turned over to the Owner's Representative.

1.9 GUARANTEE:

- A. By the acceptance of the contract award for the work herein described, the contractor assumes the full responsibility imposed by the guarantee as set forth herein and should protect himself through proper guarantee from equipment and specialty manufacturers and subcontractors as their interests may appear.
- B. All materials and equipments provided and installed under this division of the specifications shall be guaranteed for a period of **one (1) year** from the date of substantial completion and acceptance by the Owner, unless specifically noted elsewhere in the specification. Should any trouble develop during this period due to defective materials to correct the trouble without any cost noticed at the time of installation and/or during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner's Representative.

1.10 PAINTING:

- A. All equipment which is to be furnished in factory prefinished conditions by the mechanical contractor shall be left without mark, scratch, or impairment to finish upon completion of job. Any necessary refinishing to match original shall be done. Do not paint over nameplates, serial numbers, or other identifying marks. Paint all bare piping and bare steel brackets, etc. with one coat primer and two coats enamel. Color by Architect. Paint walls in all places where the mechanical contractor is called to do so on the plans because of new penetrations, etc.

1.11 SCHEDULES, MATERIALS, AND EQUIPMENT:

- A. As soon as practicable, and within 14 days after date of award of contract, and before commencement of work, a complete schedule of equipment and materials proposed for installation shall be submitted to the Owner's Representative. The schedule shall include catalogs, cuts, drawings, and such other descriptive data or samples that are requested by the Owner's Representative. Schedules shall include all items of equipment used. No partial submittals will be accepted. Provide four copies minimum.

1.12 OPERATING INSTRUCTIONS AND CATALOG INFORMATION:

- A. This contractor shall compile in loose-leaf binders catalogs containing the following: Master index, contractor and vendor list and phone numbers and addresses, general HVAC description, startup procedures, ATC schematics, maintenance instructions, balancing reports, and all equipment data sheets. Four copies shall be given to the Engineer for his approval.

1.13 EQUIPMENT, PIPE AND DUCT IDENTIFICATION:

- A. All plumbing, heating, air conditioning, automatic temperature control equipment (excluding thermostats and relays), and distribution systems shall be labeled. Electrical switches and starters for mechanical equipment shall also be labeled.
- B. Equipment labels shall be black face formica with white engraved lettering 3/16" high or

larger, and shall be attached securely.

- C. Equipment nameplates shall include the following minimum information:
  - a. Plan identification
  - b. Capacity specified at designed operating conditions
  - c. Actual capacity as balanced at site operating conditions
  - d. Area or zone served
- D. All valves, regardless of size, shall have brass tags at least 1" by 3" in size and 0.051 inches thick. Lettering on the tag shall be engraved at least 1/8 inch high. Each valve on the drawing shall be identified separately, and valve tags shall match the drawing identification.
- E. Valve tags shall be connected to valve stems by steel rings and include the following minimum information:
  - a. Plan Identification
  - b. Normal Position
  - c. Duty
  - d. Area Served
  - e. Valve Type

## PART 2 - PRODUCTS

### 2.1 MATERIALS, EQUIPMENT AND ACCESSORIES:

- A. Unless otherwise specified, all equipment, accessories, and materials shall be new and undamaged, and the workmanship shall be of the best quality for the use intended and shall be acceptable to the Owner's Representative. Equipment, accessories, and materials shall be essentially the standard products of the manufacturer, or as specified herein. Where two or more units of the same class of new equipment are required, these units shall be products of a single manufacturer.

### 2.2 MAGNETIC STARTERS:

- A. Contractor furnishing packaged equipment with ½ HP and larger in size shall furnish factory-mounted magnetic starters on all motors. Magnetic starters shall provide both overload and under voltage protection and shall have integral hand-off-auto switch, auxiliary contacts, and pilot. Starters for all motors furnished under the mechanical section of the work will be furnished and installed by the electrical contractor. Provide heater index for all starters furnished under this division.

### 2.3 SLEEVES AND BOXES:

- A. For pipes passing through masonry or concrete construction, provide sleeves at least two pipe sizes larger than the pipe passing through and made from selections of steel pipe. Provide galvanized iron sleeves with collar on each side of wall for all ducts passing through similar constructions.
- B. For pipes passing through finished partitions, or ceilings, provide galvanized sheet iron sleeves of suitable size. The sleeves shall be fastened to construction to prevent creep along pipe and the sleeve ends shall be flush with finished surfaces. Provide escutcheon plates at each side of finish wall or floor or ceiling for all pipes passing through same.

### 2.4 ACCESS DOORS:

- A. Install access doors at all fire/smoke dampers and fire dampers. Access doors to be 12" x 12" minimum clear opening size.

## PART 3 - EXECUTION

### 3.1 FUNCTIONING AND OPERATION OF EQUIPMENT:

- A. The Engineer will spend time with the Contractors prior to the final inspection to verify the operation of the system. Each Contractor is to be prepared to show the actual operation of each piece of equipment in its completed working condition. The final inspection, which the Owner will attend, will not take place until the Engineer is satisfied that the systems are 100% complete and functional. When the system is ready for the Engineer to witness the various functions, notify the Engineer to schedule time on the project.

### 3.2 CLEANING BY MECHANICAL CONTRACTOR:

- A. The contractor shall remove all stains or grease marks on walls or elsewhere caused by his workman or for which he is responsible. He shall also remove all rubbish resulting from his work, shall remove all stickers on fixtures, adjust all valves, etc., and leave the premises in first-class order.

### 3.3 SAFETY REGULATION:

- A. The contractor shall comply with all State, local, and OSHA safety requirements in performance with this work. (See General Conditions). This contractor shall be required to provide equipment, supervision, construction, procedures, and all other necessary items to assure safety to life or property.

END OF SECTION 15010

## **SECTION 15020 - SEISMIC RESTRAINT**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### **1.2 WORK INCLUDED:**

- A. All equipment, piping, and ductwork shall be adequately restrained to resist seismic forces. Restraint of rigidly mounted ductwork and piping may conform to "Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems", SMACNA/PPIC, Latest Edition, and calculations need not be submitted for restraint systems conforming to these guidelines.
- B. Anchor all mechanical equipment to the concrete or surface that supports it using expansion type anchor bolts in concrete, or bolts or lag bolts in wood structures.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS:**

- A. Products shall be made expressly for the purpose of seismic restraint, and shall be manufactured by Mason or Amber/Booth or equal.

### **PART 3 - EXECUTION**

#### **3.1 WORK:**

- A. All work is to be done in conformance with the aforementioned Codes and References.

END OF SECTION 15020

## **SECTION 15180 - INSULATION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### **1.2 WORK INCLUDED:**

- A. It is the intent of this Section of the specifications that all hot and cold surfaces of mechanical system components be insulated, unless specifically excluded herein, including existing.
- B. Insulate all new heating water lines and existing heating water lines where insulation is disturbed for construction.

### **PART 2 - PRODUCTS**

#### **2.1 COMPLIANCE:**

- A. All insulation shall conform to the requirements of the building code and have a flame spread rating of less than 25 and smoke developed less than 50. Insulation shall be as manufactured by Johns-Manville, Owens-Corning, Armstrong, or Gustin Bacon.

#### **2.2 RECTANGULAR DUCTS:**

- A. The interior surface of all rectangular low pressure supply, return, air ducts shall be lined with 1" thick fiberglass duct liner, having an average "K" factor of .23 BTU at 75 deg. F. mean. The insulation shall meet standards NFPA No. 90A and No. 90B and shall have the Underwriters' Laboratories, Inc., label. Duct sizes are clear inside dimensions; compensate for duct liner by increasing duct size accordingly.
- B. All round ductwork in unconditioned spaces shall be wrapped with 1" foil faced fiberglass insulation.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL:**

- A. The contractor shall provide a complete installation which is neat in appearance and functional. Remove all excess materials and packaging from job site.

#### **3.2 INSULATION WORKMANSHIP:**

- A. All insulation shall be applied by specialists experienced in the field, and shall be neat in appearance. Neatness in appearance shall be equated to proper insulation application procedures.

END OF SECTION 15180



## **SECTION 15500 - FIRE PROTECTION SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### **1.2 WORK INCLUDED:**

- A. The work specified in this section shall be installed by none other than a recognized sprinkler contractor regularly engaged in this work. System shall be subject to the inspection and approval of city and county fire code officials. All work shall be coordinated with other subcontractors.

#### **1.3 SCOPE:**

- A. The work includes but is not limited to the modification of the existing fire sprinkling system to accommodate the floor plan.

#### **1.4 CODES AND STANDARDS:**

- A. Wet sprinkler system - N.F.C. #13 and #14 - U.B.C.
- B. Sprinkler heads - N.F.C. #13

#### **1.5 WORK BY FIRE PROTECTION CONTRACTOR:**

- A. This contractor shall furnish and install all labor, material, and equipment to make a complete and working fire protection system fully tested and approved.

### **PART 2 - PRODUCTS**

#### **2.1 PIPING:**

- A. All piping above ground shall be rated for fire sprinkling system service.

#### **2.2 SPRINKLER HEADS:**

- A. All sprinkler heads shall be U.L. and FM approved. All piping shall be concealed in public areas and whenever possible in other areas. Heads in finished areas shall be chrome-plated recessed type heads with white canopies similar and equal to that manufactured by Reliable. Sprinklers shall be of the proper temperature rating. Location of sprinkler, head whenever reasonably possible, shall be symmetrical and coordinated with the ceiling pattern and lights. Furnish wire guards where required for protection.
- B. Furnish twelve spare heads of each type and temperature rating used, properly boxed, with sprinkler head wrench.

### **PART 3 - EXECUTION**

#### **3.1 TESTS:**

- A. Upon completion of work of this Section and prior to acceptance, subject system to tests required by underwriter's checking agency and City and/or County, with representatives of Fire Department present. Furnish Engineer with copies of certificates required by testing agencies.

END OF SECTION 15500

## **SECTION 15700 - HEATING/COOLING/VENTILATING EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### **1.2 SCOPE:**

- A. The installation covers the furnishing and installing of cooling, heating, and exhaust systems, and all necessary trim and specialties, etc., as specified and shown on drawings and as required to provide the complete heating and cooling systems.

### **PART 2 - PRODUCTS**

#### **2.1 EQUIPMENT:**

- A. All equipment shall be the capacity at 4500 ft. elevation and type shown on the drawings. Equipment manufacturers shall be as specified.

#### **2.2 ROOFTOP COOLING ONLY UNITS**

##### **A. SYSTEM DESCRIPTION**

- 1. Outdoor rooftop mounted, electrically controlled heating and cooling unit utilizing a hermetic compressor(s) for cooling duty. Unit shall discharge supply air vertically or horizontally as shown on contract drawings.

##### **B. QUALITY ASSURANCE**

- 1. Unit shall well exceed ASHRAE 90.1-2001 Energy Standards.
- 2. Unit shall be rated in accordance with ARI Standards 210/240 or 360 and 270. Designed in accordance with UL Standard 1995.
- 3. Unit shall be designed to conform to ASHRAE 15, latest revision.
- 4. Unit shall be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL-listed and certified under Canadian standards as a total package for safety requirements.
- 5. Roof curb shall be designed to conform to NRCA Standards.
- 6. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- 7. Unit casing shall be capable of withstanding 500-hours salt spray exposure per ASTM B117 (scribed specimen).
- 8. Unit shall be designed in accordance with ISO 9001, and shall be manufactured in a facility registered to ISO 9001:2000.
- 9. Each unit shall be subjected to a completely automated run testing on the assembly line. Units contain a factory-supplied printout indicating tested pressures,

amperages, data, and inspectors; providing certification of the unit status at the time of manufacture.

C. DELIVERY, STORAGE, AND HANDLING

1. Unit shall be stored and handled per manufacturer's recommendations.

D. EQUIPMENT

1. The units shall be convertible airflow. Operating range for units with electromechanical controls shall be between 115 F and 40 F. Cooling performance shall be rated in accordance with ARI testing procedures. All units shall be factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation, and control sequence before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification. Units shall be UL listed and labeled, classified in accordance to UL 1995/CAN/CSA No. 236-M90 for Central Cooling Air Conditioners. Canadian units shall be CSA Certified.
2. Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 1000 hours in a salt spray test in compliance with ASTM B117. Cabinet construction shall allow for all maintenance on one side of the unit. All exposed vertical panels and top covers in the indoor air section shall be insulated with a cleanable foil-faced, fire-retardant permanent, odorless glass fiber material. All insulation edges shall be either captured or sealed. The unit's base pan shall have no penetrations within the perimeter of the curb other than the raised 1 1/8 inch high downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up. The base of the unit shall have provisions for forklift and crane lifting, with forklift capabilities on three sides of the unit.
3. The top cover shall be one piece, or where seams exist, double hemmed and gasket sealed to prevent water leakage. Two inch pleated filters shall be factory supplied on all units.
4. All units shall have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal overloads shall be provided with the scroll compressors. Crankcase heaters shall be included.
5. All units shall have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal overloads shall be provided with the scroll compressors. Crankcase heaters shall be included.
6. Internally finned, 5/16" copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. Coils shall be leak tested at the factory to ensure the pressure integrity. The evaporator coil and condenser coil shall be leak tested to 200 psig and pressure tested to 450 psig. The condenser coil shall have a patent pending 1+1+1 hybrid coil designed with slight gaps for ease of cleaning. A removable, reversible, double-sloped condensate drain pan with provision for through the base condensate drain is standard.
7. Two inch pleated filters shall be factory supplied on all units.

8. The outdoor fan shall be direct-drive, statically and dynamically balanced, draw-through in the vertical discharge position. The fan motor(s) shall be permanently lubricated and shall have built-in thermal overload protection.
9. Indoor Fan: Units above shall have belt driven, FC centrifugal fans with adjustable motor sheaves. Units with standard motors shall have an adjustable idler-arm assembly for quick-adjustment of fan belts and motor sheaves. All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).
10. Controls: Unit shall be completely factory-wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Units will be connected to existing CSI control system in the building; provide terminal strip/interface for connection to the existing system. Unit shall provide an external location for mounting a fused disconnect device. A centralized Microprocessor shall provide an anti-short cycle timing and time delay between compressors to provide a higher level of machine protection.
11. Economizer: This accessory shall be available with barometric relief. The assembly shall include fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness with plug, spring return actuator and fixed dry bulb control. The barometric relief shall provide a pressure operated damper that shall be gravity closing and shall prohibit entrance of outside air during the equipment "off" cycle. The economizer arrives in the shipping position and shall be moved to the operating position by the installing contractor.
12. Hail guard shall protect against damage from hail and flying debris.
13. Convenience outlet: GFCI, 120v/15amp, 2 plug, convenience outlet, powered, and a service receptacle disconnect shall be available on the unit. The convenience outlet is powered from the line side of the disconnect or circuit breaker, and therefore will not be affected by the position of the disconnect or circuit breaker. This option shall be ordered along with the Through the Base Electrical and the Disconnect.
14. The roof curb shall be designed to mate with the unit's downflow supply and return and provide support and a water tight installation when installed properly. The roof curb design shall allow field fabricated rectangular supply/return ductwork to be connected directly to the curb. Curb design shall comply with NRCA requirements. Curb shall be shipped knocked down for field assembly and shall include wood nailer strips.

#### E. MANUFACTURERS

- A. Approved manufacturers are Trane, Carrier, McQuay and York.

### 2.3 ELECTRIC DUCT HEATERS

1. General: Provide open coil, electric duct heaters, as manufactured and as listed in the schedule. Power voltage and phase, control voltage, wattage, duct size, number of steps to be as per schedule. Three phase heaters shall have balanced three phase. All heaters to be UL listed for zero clearance to combustible surfaces and bear the UL label. All heaters shall meet the requirements of the latest National Electric Code.
2. Standard terminal box, recessed terminal box, standard control cabinet, remote control cabinet as well as element housing and racks all to be made of heavy gauge galvanized steel.

3. All heating coils to be made of high grade nickel/chromium resistance wire and terminated by means of a loop of wire being sandwiched between stainless steel or nickel plated washers and terminal hardware. All terminal hardware to be insulated from the heater by a two piece ceramic bushing.
4. Element Assembly to be of "Module" design with each module independently and easily removable from the terminal box or control cabinet. Each module to contain no more than 2 layers of element coils so that any one coil may be replaced without disturbing others.
5. Element coils of each module to be on staggered spacing so that all coils per module will be in the air stream, and shadowing (overheating) and/or blank areas eliminated.
6. Element Housing to be of No. 18 Ga. galvanized (aluminized) steel and to be of roll-formed construction with multiple brakes and ribs for stiffness and rigidity.
7. Element Rack to be constructed of No. 20 Ga. galvanized (aluminized) steel and formed with multiple brakes and ribs for stiffness and rigidity. Ceramic coil supports to be floating, but contained and easily replaceable. Ceramic coil insulators to be on staggered spacing per rack to eliminate blank areas in the air pattern thru the heaters, and provide uniform heating over the entire cross section of the element. Racks to support element coils on no more than 3 1/2" centers.
8. Terminal Box or Control Cabinet shall be constructed of heavy gauge galvanized steel (aluminized optional) and in sizes up to 18" X 18" shall be No. 20 gauge and over to be No. 18 gauge. All boxes to have a solid cover, of the same gauge, complete with a piano type hinge on the longest side, approved tool operated latch and pull ring. Covers over 48" long to be provided with two latches and pull rings.
9. Insulation consisting of 1/2" high density fiberglass will be provided, attached to the cabinet, between the cabinet and the heating section.
10. Recessed terminal boxes used when ducts are internally insulated, or in air handling units, to be of the same general construction as item 1 above. Airflow Direction: Heaters will be interchangeable for mounting in a horizontal or vertical duct except when position sensitive mercury contactors, SCR's or capillary type limit controls are built-in. In these cases, airflow direction is as specified.
11. Safety Controls: Primary over temperature protection shall be provided by built-in disc type automatic reset thermal cutouts for duct heaters up to 10' in width. Heaters over 40" high require two cutouts. Capillary type automatic reset thermal cutouts are required for any heater 10' wide or over. Capillary type controls to be UL listed and of the "fail safe" type. Secondary over temperature protection shall consist of a sufficient number of load carrying replaceable disc controls to de-energize the elements if the primary system fails. Fuse link type heat limiters shall not be acceptable. All manual safety devices shall be resettable thru the terminal box without removing the heater from the duct.
12. Wiring Diagrams: A separate, complete and specific wiring diagram shall be permanently attached to each heater. Typical wiring diagrams are not acceptable. Control and line terminals in each heater shall be marked identical to the wiring diagram.
13. Heater Controls: All heater controls shall be factory mounted and wired. Contactors shall be definite purpose type. No application type relays will be acceptable. All controls shall be furnished as specified.

## **SECTION 15800 - AIR DISTRIBUTION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### **2.2 WORK INCLUDED:**

- A. Work shall include ventilation, and duct systems, and all materials, equipment, and labor required to complete the system shown on plans and specified herein.

### **PART 2 - PRODUCTS**

#### **2.1 HVAC DUCTWORK:**

- A. Construct all ducts, plenums, etc., of the gauges specified below, unless otherwise shown. Sheets shall be free from blisters, slivers, pits, and imperfectly galvanized spots. Construct ducts using double or Pittsburgh corner seams. All seams shall be hammered and made airtight. Joints shall be caulked to prevent air leakage, using Duradyne or Hardcast sealers.
- B. Duct construction details shall comply with the latest edition of the SMACNA "Duct Construction Standards" manual. **Ducts shall be constructed as Seal Class "C" and 2" Pressure Class, unless otherwise indicated on plans.**
- C. Flange-type systems such as Ductmate are approved. Such systems must be installed so that joints are true and airtight with gaskets or duct sealer. Flange bolts are to be installed with lock washers or jam nuts.
- D. Flat oval and round ducts and fittings shall be gauged according to SMACNA tables. Fittings are to be constructed of 24 gauge zinc-coated steel with welded or soldered joints. All fittings shall be made by same manufacturer as the spiral lockseam conduit to facilitate a tight fit. All field joints shall be sealed with high pressure duct sealer.
- E. **Vanes with 1" long trailing edge shall be installed in all 90 elbows.**
- F. Sheet metal ducts shall be properly braced and reinforced with galvanized steel angles or other structural members, and where they protrude above roof, they shall be properly flashed. Internal ends of all clip joints shall be installed in direction of flow.

#### **2.2 ACCESS DOORS:**

- A. As indicated on the drawings and as required by code, for proper access to dampers, filter access space, etc., provide and install sheet metal access doors of the size as noted or as required for proper access to the equipment.

#### **2.3 AIR INLETS AND OUTLETS:**

- A. Furnish and install all diffusers, registers, and grilles shown and specified on the drawings. All units to have opposed blade balancing dampers. 22 ga. steel construction with white finish unless special finish is requested. Perforated-face supply diffusers are not allowed. Approved manufacturers are ADP, Nailor, Krueger, or Carnes.
- B. Diffuser shall be louver face, and return air grilles shall be eggcrate style.

2.4 MANUAL VOLUME DAMPERS:

- A. Dampers in ducts up to 16"/16" may be single blade butterfly type. Larger dampers are to be opposed blade, airfoil type. Nailor Series 1400 or equal by Krueger, Greenheck or Titus.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Verify that the work of this section may be installed in accordance with all pertinent Codes, regulations, and plans & specifications.

END OF SECTION 15800



## PART 3 - EXECUTION

### 3.1 COORDINATION:

- A. All equipment and piping shall be arranged to allow for easy maintenance.

### 3.2 PROTECTION AGAINST THE ELEMENTS:

- A. The Contractor shall, at all times, take reasonable and adequate precautions to protect his work and all stored materials and equipment from damage by the elements, including flooding, windstorms, etc., and shall not expose the work of any other Contractor to such damage.

### 3.3 ANCHORING:

- A. All mechanical equipment shall be securely mounted.

END OF SECTION 15700

## **SECTION 15900 - AUTOMATIC TEMPERATURE CONTROL**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

#### **1.2 QUALIFIED CONTRACTORS:**

- A. Only Utah Controls Company is pre-qualified to bid this project since they have an existing contract to install all controls in this building.

#### **1.3 SYSTEM DESCRIPTION:**

- A. The existing system is a CSI system installed by Utah Temperature Controls. All controls, space sensors, damper motors, enclosures, etc. shall be furnished and installed by the ATC contractor.

#### **1.4 WORK INCLUDED:**

- A. The work shall include, but is not necessarily limited to, the following: The control system shall consist of all equipment for a completely installed system of automatic temperature controls and motor starting circuits.
- B. In addition to items listed above, provide the following:
  - 1. Control wiring and conduits.
  - 2. Programming, documentation, and instruction.
  - 3. Expansion cards, sensors, and other items required for a complete system.
- C. See the drawings for additional information and sequence of control.

#### **1.5 WORK TO BE PERFORMED BY OTHERS:**

- A. The electrical contractor shall furnish and install all single phase and multiphase electrical power wiring to magnetic starters and motors.

#### **1.6 INSTALLATION BY TEMPERATURE CONTROL CONTRACTOR:**

- A. The temperature control contractor shall install all necessary electrical control wiring of all temperature controls, heating and ventilating equipment, motor starting circuit controls, and all electrical control interlock for same.
- B. All line and low voltage electrical wiring shall be installed in EMT conduit, and comply with Division 16.

#### **1.7 SUBMITTALS:**

- A. After award of contract, submit for approval four (4) copies of control diagrams. Submittal shall include complete diagrams and schematics showing control equipment, terminal

identifications, materials list, and sequence of control.

- B. Control submittals must follow the specifications format in an orderly and sequential manner. Complete submittal data shall be included on all items of equipment under the proper headings, with features called for in the specifications clearly identified. All control panels shall be drawn up to scale.
- C. Control schematics shall be provided for each control sequence specified, with all components clearly identified. Below each schematic shall be a copy of the written control sequence which incorporate (by number or description) each control component shown on the schematic.

#### 1.8 OWNER INSTRUCTION UPON COMPLETION OF PROJECT:

- A. Upon completion of the project, the temperature control contractor's representative shall spend two hours as scheduled by the building's operating personnel to instruct them on the operation of the system.

#### 1.9 GUARANTEE:

- A. All components, parts, and assemblies shall be guaranteed against defects in materials and workmanship for a period of **one year** after acceptance. Expressed warranties are conditionally based on the requirement that the items covered within the guarantee are used and maintained in accordance with the manufacturer's recommendations.
- B. The material guarantee commences at the time of the acceptance and continues for the previously indicated duration.

### PART 2 - PRODUCTS

#### 2.1 GENERAL:

- A. All products shall be compatible with the existing system.
- B. No thermostat shall be located on outside walls.
- C. Mount thermostats at distance 54" above floor.
- D. Heating setpoint shall be 72°F, and the cooling setpoint shall be 75°F or as required by the owner. Field verify.

### PART 3 - EXECUTION

#### 3.1 VERIFICATION OF CONTROL:

- A. The control contractor shall show the Owner's Representative that all controls work functionally. The contract shall not be complete until this demonstration is made. Instruct the Owner in the proper calibration and operation of all equipment.

END OF SECTION 15900

## SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Supporting devices for electrical components.
  - 2. Electrical demolition.
  - 3. Cutting and patching for electrical construction.
  - 4. Touchup painting.

#### 1.3 SUBMITTALS

- A. Submittal Procedures: Submittal procedures are specified in Division 1.
  - 1. Prepare submittals in three-ring "hard cover" binders with project name and volume on the binding. Include tabs identified by the specification section and in numerical order. Include plastic sleeves to hold drawings that exceed 8-1/2" x 11".
  - 2. Include cover sheet with the following information: date, project name, address, and title; Installer's name, address and phone number; Project manager, and Engineering firm names and phone numbers.
- B. Project Record Documents: Project Record Documents are specified in Division 1.
  - 1. Redline changes or information recognized to be of importance to the Owner. Include wiring changes, panelboard changes, etc.
  - 2. Dimension underground wiring and other concealed electrical features.
  - 3. Redline actual equipment electrical characteristics on equipment schedules.
- C. Digital Operation and Maintenance Manual on CD-ROM
  - 1. Intuitive CD-ROM instructional manual for information to care, adjust, maintain and operate equipment. Include contract documents, shop drawings, product data.
    - a. Software: Adobe Acrobat.
    - b. Format: PDF.
    - c. Index: Hypertext alphabetical index.
    - d. Auto Starting: Windows 9X with any directions to continue observable on the screen.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.
- C. Comply with Owner Standards.
  - 1. State of Utah, Division of Facilities Construction and Management "Design Criteria".

- D. Installer Qualifications: All workmen doing electrical work shall be duly licensed with the required supervision in the State or Locality as legally required.
  - 1. Site Review: All electricians must carry their electrician's license with them and show it upon request.

## 1.5 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
  - 1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- C. Coordinate electrical equipment installation with other building components.
  - 1. Verify all dimensions be field measurements.
  - 2. Minimize costs to resolve equipment and other conflicts by successfully concluding pre-installation conferences. Include the following:
    - a. Review Division 15 shop drawings. Compare equipment electrical specifications with equipment schedule. Prevent Div 15 equipment encroaching on clearances required by NEC. Request clarification of conflicts prior to installation.
    - b. Determine whether lighting fixtures and other electrical items conflict with the location of structural members and mechanical or other equipment.
    - c. Coordinate connecting electrical service to components furnished in other sections of the specification or by the User. Verify electrical requirements including voltage, full load amps, and minimum wire ampacity prior to installing or purchasing the associated electrical equipment and wiring.
- D. Coordinate with Authorities Having Jurisdiction including: DFCM and Utah National Guard.
  - 1. Obtain all permits (including excavation permits) prior to beginning construction.
  - 2. Request inspections required by Authorities Having Jurisdiction in a timely manner and in order to comply with sequencing requirements.

## PART 2 - PRODUCTS

### 2.1 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel Supports: Comply with Division 5 Section "Metal Fabrications" for slotted channel framing.
  - 1. Channel Thickness: Selected to suit structural loading.
  - 2. Fittings and Accessories: Products of the same manufacturer as channel supports.
- D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

- F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- G. Expansion Anchors: Carbon-steel wedge or sleeve type.
- H. Toggle Bolts: All-steel springhead type.

## 2.2 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. For Nonequipment Surfaces: Matching type and color of undamaged, existing adjacent finish.
- C. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

## PART 3 - EXECUTION

### 3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.
- E. Existing Utilities: Locate and identify existing underground utilities in excavation areas or in demolition areas. Maintain services to areas outside demolition limits or excavated areas. When services must be interrupted, install temporary services for affected areas.
- F. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements indicated in the Contract Documents.
- G. Record drawings and Shop Drawings: Mark up drawings daily during construction with changes or deletions in the scope of the project.

### 3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Selection of Supports: Comply with manufacturer's written instructions.

- E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb (90-kg) design load.

### 3.3 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
  - 1. Comply with NFPA 70. In addition, install supports within 12" of couplings, fittings, and boxes, with a minimum of two supports per 10 foot length of raceway. Install supports at each change of direction. Similarly support cables in cable trays or raceways as indicated; except, provide J-hooks to support cables.
  - 2. Support suspended conduit and cables independently from all other electrical or mechanical systems by attaching directly from building structure, unless prior approval in writing has been obtained from the Architect after engineering calculations have been submitted.
  - 3. Coordinate installation of supports so as not to interfere with the removal of ceiling tiles, the service of mechanical equipment, etc.
  - 4. Install bracing parallel to trusses, beams, joists, bridging, etc.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Support parallel runs of cables together on trapeze or bracket type hangers, either vertically or horizontally.
- E. Size supports for multiple raceway and cable installations so capacity can be increased by a 25 percent minimum in the future.
- F. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- G. Install 1/4-inch- (6-mm-) diameter or larger threaded steel hanger rods, unless otherwise indicated.
- H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- I. Simultaneously install vertical conductor supports with conductors.
- J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If supported directly from the building structure, attach box to framing on opposite sides of the box. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.
- K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

1. Install wrapped or coated RMC sleeves with 3 feet extending on each side through penetrations of foundations or concrete walls by RNC.
- M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
1. Wood: Fasten with wood screws or screw-type nails.
  2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
  3. New Concrete: Concrete inserts with machine screws and bolts.
  4. Existing Concrete: Expansion bolts. Drill holes in concrete so holes do not cut main reinforcing bars. Fill and seal holes drilled in concrete and not used.
    - a. Obtain prior approval from project structural engineer prior to drilling prestressed or post-tension concrete slabs and beams.
  5. Steel: Welded threaded studs or spring-tension clamps on steel.
    - a. Field Welding: Comply with AWS D1.1.
  6. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
  7. Light Steel: Sheet-metal screws.
  8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load. Do not support electrical equipment or conduits with toggle bolts, moly-bolts, or screws in sheetrock or plaster. Do not support electrical equipment or conduit from tie wires.
  9. Do not use wooden plugs in concrete or masonry units for fastening conduits, tubing, boxes, cabinets, etc.

### 3.4 FIRESTOPPING

- A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."

### 3.5 DEMOLITION

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
1. Relocate existing electrical devices, conduit or equipment that for any reason obstructs construction. Include any equipment having electrical connections that requires disconnecting and reconnection at the same or another location throughout the course of construction.
  2. Maintain in working condition all electrical equipment and apparatus in areas not remodeled.
  3. Temporary Partitions or Dust Barriers: Prevent the spread of dust and dirt to adjacent areas.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
1. Include exposed equipment and installations made obsolete by new work.
- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches (50 mm) below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove and legally dispose of demolished material from Project site.



- E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.
- F. Remove conductors from raceway to the first active outlet or branch panels for vacated or unused circuits.

### 3.6 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

### 3.7 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
  - 1. Supporting devices for electrical components.
  - 2. Concrete bases.
  - 3. Electrical demolition.
  - 4. Cutting and patching for electrical construction.
  - 5. Touchup painting.
- B. Test all electrical work to ensure that they test free of mechanical and electrical defects.
  - 1. Comply with testing requirements of authorities having jurisdiction.
  - 2. Comply with Owner's standards for testing in documents listed in "Quality Assurance".

### 3.8 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."
  - 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
  - 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
  - 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

### 3.9 CLEANING AND PROTECTION

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
  - 1. Remove labels that are not permanent labels.
  - 2. Wipe surfaces of electrical equipment. Remove excess lubrication and other substances.
  - 3. Clean exposed exterior and interior hard-surface finishes to a dust-free condition, free of stains, films and similar foreign substances.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 16050

## SECTION 16075 - ELECTRICAL IDENTIFICATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

#### 1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

#### 1.4 QUALITY ASSURANCE

- A. Comply with ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with ANSI A13.1 and NFPA 70 for color-coding.

### PART 2 - PRODUCTS

#### 2.1 RACEWAY AND CABLE LABELS

- A. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide (0.08 mm thick by 25 to 51 mm wide).
- B. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- C. Aluminum, Wraparound Marker Bands: Bands cut from 0.014-inch- (0.4-mm-) thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.
- D. Plasticized Card-Stock Tags: Vinyl cloth with preprinted and field-printed legends. Orange background, unless otherwise indicated, with eyelet for fastener.
- E. Brass or Aluminum Tags: 2 by 2 by 0.05-inch (51 by 51 by 1.3-mm) metal tags with stamped legend, punched for fastener.

#### 2.2 NAMEPLATES AND SIGNS

- A. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.
- B. Engraved Plastic Nameplates and Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
  - 1. Engraved legend with black letters on white face.

2. Punched or drilled for mechanical fasteners.
- C. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32, stainless-steel machine screws with nuts and flat and lock washers.

## 2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.
  1. Minimum Width: **3/16 inch (5 mm)**.
  2. Tensile Strength: **50 lb (22.3 kg)** minimum.
  3. Temperature Range: **Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C)**.
  4. Color: According to color-coding.
- B. Paint: Formulated for the type of surface and intended use.
  1. Primer for Galvanized Metal: Single-component acrylic vehicle formulated for galvanized surfaces.
  2. Primer for Concrete Masonry Units: Heavy-duty-resin block filler.
  3. Primer for Concrete: Clear, alkali-resistant, binder-type sealer.
  4. Enamel: Silicone-alkyd or alkyd urethane as recommended by primer manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.
- C. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before applying.
- E. Circuits with More Than 600 V: Identify raceway and cable with "DANGER--HIGH VOLTAGE" in black letters 2 inches (51 mm) high, stenciled with paint at 10-foot (3-m) intervals over a continuous, painted orange background. Identify the following:
  1. Entire floor area directly above conduits running beneath and within 12 inches (305 mm) of a basement or ground floor that is in contact with earth or is framed above unexcavated space.
  2. Wall surfaces directly external to conduits concealed within wall.
  3. All accessible surfaces of concrete envelope around conduits in vertical shafts, exposed in the building, or concealed above suspended ceilings.
  4. Entire surface of exposed conduits.
- F. Install painted identification according to manufacturer's written instructions and as follows:
  1. Clean surfaces of dust, loose material, and oily films before painting.
  2. Prime surfaces using type of primer specified for surface.
  3. Apply one intermediate and one finish coat of enamel.
- G. Circuit Identification Labels on Boxes: Install labels externally for all installed boxes prior to installation of conductors.
  1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.

2. Concealed Boxes: Plasticized card-stock tags.
  3. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.
- H. Circuit Identification Labels on Plates: Install labels externally for all installed wiring device plates indicating panel and circuit number.
1. Engraved plates.
- I. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.
- J. Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Where width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm) overall, use a single line marker. Install line marker for underground wiring, both direct buried cables and cables in raceway.
- K. Color-Coding of Secondary Phase Conductors: Color code switch legs, travelers and other wiring for branch circuits other than those listed below. Permanently post color code at each branch panelboard. Use the following colors for service, feeder and branch-circuit phase conductors:
1. 208/120-V Conductors:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.
    - d. Neutral: White.
    - e. Ground: Green.
    - f. Insulated Ground: Green with white stripe.
  2. Above 1kV System: As follows:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Orange.
    - d. Neutral: White.
    - e. Ground: Green.
  3. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 6 AWG:
    - a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use 1-inch- (25-mm-) wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.
- L. Power-Circuit Identification: Metal tags or aluminum, wraparound marker bands for cables, feeders, and power circuits in vaults, pull and junction boxes, manholes, and switchboard rooms.
1. Legend: 1/4-inch- (6.4-mm-) steel letter and number stamping or embossing with legend corresponding to circuit designations.
  2. Tag Fasteners: Nylon cable ties.
  3. Band Fasteners: Integral ears.
- M. Apply identification to conductors as follows:
1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.
  2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.

3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.
- N. Apply warning, caution, and instruction signs as follows:
1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
  2. Install caution signs for enclosures Over 600 V: Indicate system voltage on black, preprinted on orange field.
- O. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high lettering on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:
1. Interior and exterior of panelboards, electrical cabinets, and enclosures.
    - a. Distribution Panelboards: Identify Distribution Panelboard designation and circuit serving distribution panelboard; label main and distribution overcurrent protection showing load served and location (identify room numbers).
    - b. Branch Panelboards: Identify distribution panel and circuit serving panelboard.
    - c. Main Overcurrent Protection: Identify main device and service disconnects.
  2. Access doors and panels for concealed electrical items.
  3. Disconnect switches.
  4. Transformers.
- P. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

END OF SECTION 16075

## SECTION 16110 - COMMUNICATIONS HORIZONTAL CABLING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes wire, cable, connecting devices, patch cords, racks, installation, wire management, and testing for wiring systems to be used as signal pathways for voice and high-speed data transmission.

#### 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. IDC: Insulation displacement connector.
- C. LAN: Local area network.
- D. PLENUM CABLE: Listed for use in air-handling spaces.
- E. PVC: Polyvinyl chloride.
- F. UTP: Unshielded twisted pair.

#### 1.4 SUBMITTALS

- A. General: Include data pertaining appurtenances and accessories:
  - 1. Comply with Division 1 section "Submittals". Include minimum of ten (10) 3-ring binders.
  - 2. Properly mark specific service or function, and intended location of use within project (i.e., voice BDC and IDC termination).
  - 3. Clearly identify or highlight to indicate applicable items.
  - 4. Properly mark with external connection identification as related to the project where they consist of standard factory assembly or field installation drawings.
- B. Product Data: Include data on features, ratings, and performance for each component specified, including but not limited to:
  - 1. Each type of cable.
  - 2. Each type of cable connector.
  - 3. Each type of patch panel.
  - 4. Each type of wire management.
  - 5. Complete outlet assembly including frame, jacks, and cover plate.
  - 6. Each type of identification label.
- C. Shop Drawings: Include dimensioned plan and elevation views of each individual component. Show equipment assemblies, method of field assembly, workspace requirements, and access for cable connections.

1. System labeling schedules, including electronic copy of labeling schedules, as specified in Part 3, in software and format selected by Owner.
  2. Wiring diagrams. Show typical wiring schematics including the following:
    - a. Workstation outlets, jacks, and jack assemblies.
    - b. Patch cords.
    - c. Patch panels.
    - d. Fiber-optic boxes.
- D. Cable Administration Drawings: As specified in Part 3.
- E. Samples: For workstation outlets, jacks, jack assemblies, and faceplates for color selection and evaluation of technical features.
- F. Product Certificates: For each type of cable, connector, and terminal equipment, signed by product manufacturer.
1. Certify that the cables are suitable for the connected equipment.
  2. UL labeled and/or listed.
  3. Clearly identify transmission parameters specified (reference category 5 or higher rating).
- G. Manufacturer Seismic Qualification Certification: Submit certification that distribution racks and their components will withstand seismic forces. Include the following:
1. Basis for Certification: Base certification on the maximum number of components capable of being mounted in each rack type. Identify components on which certification is based. Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity of each rack-mounted component and of each assembled rack type, and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- H. Qualification Data:
1. Installer must show proof of current certification of the Siemon Cabling System via an updated card given after attending the five day recertification classs.
  2. Installer must be trained and certified in fiber optic cabling, splicing, termination and testing techniques. Must have experience using a light meter and OTDR
  3. Must be trained in the installation of pathways and support for housing horizontal and backbone cabling.
- I. Provide list of test equipment to be used including documentation indicating that the proposed equipment is capable of performing all of the tests required.
- J. Field quality-control test reports.
- K. Operation and Maintenance Data: For voice and data communication cabling to include in emergency, operation, and maintenance manuals.
- 1.5 QUALITY ASSURANCE
- A. The Utah National Guard (UTNG) desires to have Telecommunication parts installed in accordance with Industry Standard TIA/568B. All projects must be coordinated and approved through the UTNG State Telecommunications Manager (Mike Hansen, 801-523-4118) to

ensure that industry standards are adhered to. All telecommunication work to be done on any Utah Army National Guard Facility will be coordinated and approved through Mike Hansen (pager # (801) 249-3838) or Toby Adamson (pager # (801) 241-9942). Layout for telecommunication closets will be as followed. There will be 1 or more sheets of ¾ inch plywood placed on the wall of the telecommunication closet. From left to right the positioning of the metal backboards will be Green, Blue, and Yellow. You will leave proper space between the blue and yellow boards to accommodate future growth. Along the bottoms of each of the backboards you will install full spool boards. On the Green backboard you will install the copper feeds for the building. The copper feeds will be terminated to lightning protection and then to the Siemon 24 port patch panel. On the Blue backboard, the Blue Commscope CAT 5E 55N4R BL\*\*\*, will be terminated to the Siemon HD5-89D-12 \*\*\* patch panel. On the Yellow backboard, the Yellow Commscope CAT 5E 55N4R YL\*\*\*, will be terminated to the Siemon HD5-89D-12 \*\*\* patch panel. There will be one blue and one yellow CAT 5 or CAT 6 wire pulled to each location. They will correlate with the same number on the patch panel (ex. Jack 101 will have one blue and one yellow wire that will be in the same location on the patch panel.). Fiber will be terminated in an LIU can. Termination of fiber will be either ST or SC. This will depend on location. You will need to speak with Mike or Toby in order to know what facility has what termination.

\*\* This equipment is being used in the Draper facility

\*\*\* There are some Facilities that have CAT 6 horizontal cable. You will have to speak with Mike or Toby in order to know what is required at each Facility.

- B. Installer Qualifications: System installer must have on staff a registered communication distribution designer certified by Building Industry Consulting Service International.
  - 1. Factory Certification: Perform installation with factory trained and certified technicians by the manufacturers of the cabling system to be installed.
  - 2. Pre-approved Installers: Subject to compliance with contract documents, installers approved for this project are as follows:
    - a. Americom Technology.
    - b. Cache Valley Electric
    - c. Federal Communications Group.
    - d. Lumix Communications
    - e. Niels Fugal & Sons Company.
- C. Source Limitations: Obtain generic type of products through one source from a single manufacturer, except for the following:
  - 1. Wire Management.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with NFPA 70.
- F. Comply with FCC Part 68, Chapter 1, "US Code of Federal Regulations, "Title 47 for all telephone system wire and cable connection components.
- G. Comply with latest EIA/TIA, UL, IEEE, and ICEA standards for structured cabling products and installation.



1. "Commercial Building Wiring Standard:" EIA/TIA 568.
2. "Commercial Building Standard for Telecommunications Pathways and Spaces:" EIA/TIA 569.
3. "Color Marking of Thermoplastic Wire:" EIA-230.
4. "Commercial Building Telecommunications Wiring Standards": TSB 40.
5. "Performance Specifications for Field Testing of Unshielded Twisted Pair Cabling Systems": TSB 67.
6. Standards pertaining to optical-fiber cable and system component construction and installation: EIA-440, -455, -458, -475, and -509.
7. Certified type PCC FT4 FT6 for plenum cable.
8. ICEA S80-576.
9. UL Subject 444

## 1.6 COORDINATION

- A. Coordinate layout and installation of voice and data communication cabling with Owner's telecommunications and LAN equipment suppliers. Coordinate service entrance arrangement with local exchange carrier.

1. All work must be coordinated thru the UTNG State Telecommunications Manager (Mike Hansen, pager 801-249-3838) to ensure that industry standards are followed.
2. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
3. Record agreements reached in meetings and distribute to other participants.
4. Adjust arrangements and locations of distribution frames and cross-connect and patch panels in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

## 1.7 WARRANTY

- A. Special Project Warranty: Manufacturer's standard form in which manufacturer of structured cabling system and the principal installer agree to replace and install structured cabling components that fail in materials or workmanship, or do not meet manufacturer's official published specifications and performance criteria within the Special Project Warranty Period specified below. This includes labor and materials. This warranty shall be in addition to, and not a limitation of, other rights and remedies the Owner may have against the Contractor under the Contract Documents.

1. Warranty Period: 20 years minimum from date of Substantial Completion.

## 1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Cable: 500 feet (76 m) of each size and type used for Project. Furnish on reels.
2. Outlet Assemblies: One of each type for every 25 installed, but no fewer than one.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cable:
  - a. Commscope.
2. Terminal and Connector Components:
  - a. The Siemon Company.
3. Distribution Racks and Wire Management:
  - a. The Siemon Company.

## 2.2 EQUIPMENT/CABLING LIST

- A. Equip the system with items identified in the Equipment/Cabling List. Do not construe this list as a "bill of materials". This list identifies items of significance used during the design of the cabling installation. Where the items indicated are one portion of an assembly, provided entire assembly unless specified otherwise.

1. Siemon HD5-89D-12 Patch Panels.
2. Siemon HD6-89D-12 Patch Panels. \*\*\*
3. Siemon S210MB2-192 \*\*
4. Siemon S188-300 Vertical Wire Management \*\*
5. Siemon S188WD Horizontal Wire Management \*\*
6. Siemon S110M-WM-300 Vertical Wire Management \*\*
7. Siemon S210MB2-300 \*\*
8. Siemon S210C-4 \*\*
9. Siemon CT-5-C5-02 Angled Jack.
10. Siemon CT-C6-C6-02 Angled Jack. \*\*\*
11. Siemon CT2-FP-02 Faceplate.
12. Siemon CT MuTOA CT-MMO-02
13. Siemon SPB-V1 24 Port Patch Panel.
14. Commscope CAT 5E Blue 55N4R BL
15. Commscope CAT 5E Yellow 55N4R YL
16. Commscope CAT 6 Blue 75N4 BL \*\*\*
17. Commscope CAT 6 Yellow 75N4 YL\*\*\*
18. Green Backboard Metal M183 B2 (VAR)
19. Blue Backboards Metal M183 B1 (VAR)
20. Yellow Backboards Metal M183 B5 (VAR)
21. Full Spool boards. M187 B1 (VAR)
22. Marconi R66P25QC Lighting Protection Panel.
23. Marconi R66P50QC Lighting Protection Panel.
24. Marconi R66P100QC Lighting Protection Panel.
25. SECOR WIC 012 LIU can.
26. Siemon Rack Mount LIU FCP3-Rack. \*\*
27. Gas Protection Fuses 104410147

### **MDF (Main Distribution Frame) for AGCW**

Standard Equipment:

1. AVAYA 107894966 100 Pair Lighting Protection 110 termination style.
2. SECOR CCH03U 72 Strand Rack Mount LIU.

The MDF at AGCW is in building 617. To gain access to this area you will have to contact Mike Hansen at (801) 249-3838 or Toby Adamson at (801) 241-9942. **All work to be bid on or done at AGCW will contact Mike or Toby prior to starting.**

## **IDF (Intermittent Distribution Frame) for AGCW**

Standard Equipment:

28. Siemon HD5-89D-12 Patch Panels.
29. Siemon HD6-89D-12 Patch Panels. \*\*\*
30. Siemon CT-C5-C5-02 Angled Jack.
31. Siemon CT-C6-C6-02 Angled Jack. \*\*\*
32. Siemon CT2-FP-02 Faceplate.
33. Siemon CT MuTOA CT-MMO-02
34. Siemon SPB-V1 24 Port Patch Panel.
35. Commscope CAT 5E Blue 55N4R BL
36. Commscope CAT 5E Yellow 55N4R YL
37. Commscope CAT 6 Blue 75N4 BL \*\*\*
38. Commscope CAT 6 Yellow 75N4 YL\*\*\*
39. Green Backboard Metal M183 B2 (VAR)
40. Blue Backboards Metal M183 B1 (VAR)
41. Yellow Backboards Metal M183 B5 (VAR)
42. Full Spool boards. M187 B1 (VAR)
43. Marconi R66P25QC Lighting Protection Panel.
44. SECOR WIC 012 LIU can.
45. Gas Protection Fuses 104410147

### **2.3 SYSTEM REQUIREMENTS**

- A. General: Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.
- B. Expansion Capability: Unless otherwise indicated, provide positions in cross-connect, patch panels, and mounting space on each backboard or in each rack to accommodate 20 percent future increase in outlets of each type.
- C. Equipment Capability: Unless otherwise indicated, provide 100% of patch panel and wire management space in each rack for owner furnished equipment.

### **2.4 MOUNTING ELEMENTS**

- A. Raceways and Boxes: Comply with Division 26 Section "Raceways and Boxes for Electrical Systems."
- B. Backboards: 3/4-inch (19-mm), interior-grade, painted fire-retardant-treated plywood floor.
- C. Distribution Racks: Modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.

### **2.5 IDENTIFICATION PRODUCTS**

- A. Comply with Division 26 Section "Identification for Electrical Systems" and the following:
  1. Cable Labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Refer to Division 26 drawings for additional locations of outlets, communication rooms, and cable trays.
  - 2. Provide inner duct for all fiber optic cables installed in cable tray, loose, or in conduit with diameters in excess of 1.5 inches.

### 3.2 APPLICATION OF MEDIA

- A. Horizontal Cable for Data Service: Refer to drawings for cable for runs between wiring closets and workstation outlets.
- B. Horizontal Cable for Voice Service: Refer to drawings for cable for runs between wiring closets and workstation outlets.

### 3.3 INSTALLATION

- A. Wiring Method: Install wiring in raceway and cable management systems except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.
  - 1. Where raceways are not provided, install cabling in accessible ceilings, minimum 18" above suspended ceiling. Support cable a minimum of every 30" from the building structure. Do not support cable from suspended ceilings. Install cables above accessible ceilings in common areas and corridors to the furthest possible point for convenient access.
- B. Install cables using techniques, practices, and methods that are consistent with Category rating of the cable installed and that ensure the performance of the completed and linked signal paths, end to end, of the category rating indicated.
- C. Install cables without damaging conductors, shield, or jacket.
- D. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer.
- E. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
  - 1. Pull cables simultaneously if more than one is being installed in same raceway.
  - 2. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor or insulation.
  - 3. Use pulling means, including fish tape, cable, rope, and basket-weave wire or cable grips, that will not damage media or raceway.
- F. Install exposed cables parallel and perpendicular to surfaces or exposed structural members and follow surface contours where possible.
- G. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
- H. Wiring within Wiring Closets and Enclosures: Provide conductors of adequate length. Train conductors to terminal points with no excess. Use wire distribution spools at points where

cables are fanned or conductors turned. Use lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer. Connect conductors that are terminated, spliced, or interrupted to terminal blocks. Label each terminal with designations approved by the Owner. Install wiring on racks and at wall mounted connection blocks through wire management devices.

- I. Separation of Wires: Comply with TIA/EIA-569-B rules for separating unshielded copper voice and data communication cabling from potential EMI sources, including electrical power lines and equipment.
  - 1. Do not install structured cabling within 12" of power and lighting wiring, or within 12" of a fluorescent lighting and electrical fixtures.
- J. Make splices, taps, and terminations only at indicated outlets, terminals, and cross-connect and patch panels.
- K. Use splice and tap connectors compatible with media types.
- L. Riser Cables: Install all riser cables through 5" sleeves. Support riser cable through sleeves at a minimum of even floor number intervals. Select support system based on site conditions and weight of cable.

### 3.4 GROUNDING

- A. Comply with Division 26 Section "Grounding and Bonding for Electrical Systems."
- B. Ground and bond all equipment racks and wall fields. Provide grounding connections for cable and other system components as required by manufacturer's written instructions and TIA/EIA 607, "Grounding and Bonding of Telecommunications Systems".
  - 1. Terminate all ground conductors to ground terminals or ground buses in equipment rooms and wiring closets.
  - 2. Conductors: #6 AWG, THWN, Copper, color coded green.
- C. Signal Ground Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
- D. Signal Ground Bus: Mount on wall of main equipment room with standoff insulators.
- E. Signal Ground Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

### 3.5 INSTALLATION IN EQUIPMENT ROOMS AND WIRING CLOSETS

- A. Install plywood backboards on walls of equipment rooms and wiring closets from floor to ceiling.
- B. Mount patch panels, terminal strips, and other connecting hardware on backboards, unless otherwise indicated.
- C. Group connecting hardware for cables into separate logical fields.
- D. Use patch panels to terminate cables entering the space, unless otherwise indicated.

### 3.6 INSTALLATION STANDARDS

- A. Comply with requirements in TIA/EIA-568-B and TIA/EIA-569-B

### 3.7 IDENTIFICATION

- A. In addition to requirements in this Article, comply with applicable requirements in Division 26 Section "Identification for Electrical Systems" and TIA/EIA-606-A.
- B. System: Use a unique, three-syllable, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with same designation. Use logical and systematic designations for facility's architectural arrangement.
  - 1. First syllable identifies and locates equipment room or wiring closet where cables originate.
  - 2. Second syllable identifies and locates cross-connect- or patch-panel field in which cables terminate.
  - 3. Third syllable designates type of media (copper or fiber) and position occupied by cable pairs or fibers in field.
- C. Workstation: Label cables within outlet boxes.
- D. Distribution Racks and Frames: Label each unit and field within that unit.
- E. Within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- F. Cables, General: Label each cable within **4 inches (100 mm)** of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
- G. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding **15 feet (4.5 m)**.
- H. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project, in software and format selected by Owner.
  - 1. Provide cable records on an automated dBase or Excel compatible program. Establish fields for recording of active and inactive cable pairs to be input by Owner's personnel at a later date. Correlate WSI number, distribution cable number, punch down block or frame assignments, conduit or duct path and station location. Update record as the project progresses to reflect required changes.
- I. Cable Administration Drawings: Show building floor plans with cable administration point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606. Furnish electronic record of all drawings, in software and format selected by Owner.
  - 1. Drawing Format: AutoCAD 2000.

### 3.8 FIELD QUALITY CONTROL

- A. Perform testing as required for Siemon 20 year warranty and provide reports to owner personnel.

### 3.9 DEMONSTRATION

- A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and extending wiring to establish new workstation outlets. Refer to Division 1 Section "Closeout Procedures."
  - 1. Include a description of the systems, a tour of the facilities, and a tutorial on using the cable testers and documentation software.
  - 2. Include sufficient level of training to the Owner's staff to allow for installation and maintenance to be carried out to the manufacturer's specifications.
  - 3. Subsequent to hookups of telephone/data distribution systems, operate control/signal systems to demonstrate proper functioning. Replace malfunctioning media with new materials, and then retest until satisfactory performance is achieved.
  - 4. Documentation: Use the above time domain reflectometer to make a strip chart recording of transmission characteristics, wave form, and performance of all segments of the installation at the time of commissioning. Also, use an optical loss test set (OLTS) to measure the optical transmission loss on each optical fiber path in the system. Record loss data in a form with provision for at least 50 additional loss data entries during future maintenance operations. Bind the recordings in a cable record book indexed for easy reference during future maintenance operations and turn book over to the Owner's authorized representative.

END OF SECTION 271500

## SECTION 16120 - CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.
- B. Related Sections include the following:
  - 1. Division 16 Section "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field Quality-Control Test Reports: From Contractor.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

#### 2.2 CONDUCTORS AND CABLES

- A. Manufacturers:
  - 1. Copper Wire and Cables:
    - a. Alcan Aluminum Corporation; Alcan Cable Div.
    - b. American Insulated Wire Corp.; a Leviton Company.
    - c. General Cable Corporation.
    - d. Senator Wire & Cable Company.
    - e. Southwire Company.
- B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.



- C. Conductor Material: Copper, minimum size #12 for phase conductors and #14 for control conductors complying with NEMA WC 7; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.
- D. Conductor Insulation Types: Type THWN-2 complying with NEMA WC7.

## 2.3 CONNECTORS AND SPLICES

- A. Manufacturers:
  - 1. AFC Cable Systems, Inc.
  - 2. AMP Incorporated/Tyco International.
  - 3. Burndy.
  - 4. Hubbell/Anderson.
  - 5. IIsco.
  - 6. O-Z/Gedney; EGS Electrical Group LLC.
  - 7. 3M Company; Electrical Products Division.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR AND INSULATION APPLICATIONS

- A. Service Entrance: Type THWN-2, single conductors in raceway.
- B. Exposed Feeders: Type THWN-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THWN-2, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THWN-2, single conductors in raceway. Exposed Branch Circuits, including in Crawlspace: Type THWN-2, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THWN-2, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THWN-2, single conductors in raceway.
- H. Underground Feeders and Branch Circuits: Type THWN-2, single conductors in raceway.
- I. Emergency circuits: Install in separate raceways from all other wiring, except where they connect to the same equipment for two-source operation.
- J. Class 1 Control Circuits: Type THWN-2, in raceway.
- K. Class 2 Control Circuits: Type THWN-2, in raceway.
- L. Fixture Conductors: Install conductors in lighting fixtures with insulation ratings as recommended by the manufacturer's written instructions or a minimum 90 degrees C., whichever is higher.

### 3.2 INSTALLATION

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. GFI circuit breakers or feed-thru outlets to outlets served: provide separate neutrals.
- C. Panelboards, switchboards, MCCs, switchgear: Do not route conductors through a section which terminate in another section, except for interconnecting control conductors.
- D. Remove existing conductors from raceway before pulling in new wires and cables.
- E. Parallel conductors: Where parallel conductors are installed in parallel raceways, install in each raceway conductors of phase, neutral and/or ground as specified. Carefully cut parallel conductors to identical length for each phase leg. Do not parallel conductors less than #1/0.
- F. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- G. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- H. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- I. Do not install wiring through any part of a transformer vault or elevator equipment room and shaft that is does not serve equipment in the respective room. Also, coordinate that piping or other items foreign to the transformer vault, elevator equipment room or shaft is not installed in these spaces.
- J. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."
- K. Seal around cables penetrating fire-rated elements according to Division 7 Section "Through-Penetration Firestop Systems."
- L. Identify and color-code conductors and cables according to Division 16 Section "Electrical Identification."

### 3.3 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Conductor splices: Minimize conductor splices. Do not install in conduit bodies.
- C. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors. Install compression type connectors for aluminum conductors or copper pigtail adapters for installation in mechanical lugs.
- D. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.
- E. Furniture connections: connect systems furniture to power supply circuits per manufacturer's written instructions.

- F. Panelboard connections: do not splice conductors in panelboards.

#### 3.4 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality-control testing:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
  - 2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Test Reports: Prepare a written report to record the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 16120

## SECTION 16130 - RACEWAYS AND BOXES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
  - 1. Division 7 Section "Through-Penetration Firestop Systems" for firestopping materials and installation at penetrations through walls, ceilings, and other fire-rated elements.
  - 2. Division 16 Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.
  - 3. Division 16 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

#### 1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. LFNC: Liquidtight flexible nonmetallic conduit.
- F. RNC: Rigid nonmetallic conduit.

#### 1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: Show fabrication and installation details of components for raceways, fittings, boxes, enclosures, and cabinets.

#### 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

#### 1.6 COORDINATION

- A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

### 2.2 METAL CONDUIT AND TUBING

- A. Manufacturer:
  - 1. AFC Cable Systems, Inc.
  - 2. Alflec Inc.
  - 3. Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 4. Electri-Flex Co.
  - 5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
  - 6. LTV Steel Tubular Products Company.
  - 7. Manhattan/CDT/Cole-Flex.
  - 8. O-Z Gedney; Unit of General Signal.
  - 9. Wheatland Tube Co.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. Plastic-Coated Steel Conduit and Fittings: NEMA RN 1.
- E. Plastic-Coated IMC and Fittings: NEMA RN 1.
- F. EMT and Fittings: ANSI C80.3.
  - 1. Fittings: Steel set-screw or compression type. Do not use die-cast fittings.
- G. FMC: Zinc-coated steel.
- H. LFMC: Flexible steel conduit with PVC jacket.
- I. Fittings: NEMA FB 1; compatible with conduit and tubing materials. Do not use die-cast fittings.

### 2.3 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturer:
  - 1. American International.
  - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 3. Arnco Corp.
  - 4. Cantex Inc.
  - 5. Certainteed Corp.; Pipe & Plastics Group.
  - 6. Condux International.
  - 7. ElecSYS, Inc.
  - 8. Electri-Flex Co.
  - 9. Lamson & Sessions; Carlon Electrical Products.

10. Manhattan/CDT/Cole-Flex.
11. RACO; Division of Hubbell, Inc.
12. Spiraldut, Inc./AFC Cable Systems, Inc.
13. Thomas & Betts Corporation.

- B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.
- C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.
- D. LFNC: UL 1660.

## 2.4 METAL WIREWAYS

- A. Manufacturer:
  1. Hoffman.
  2. Square D.
- B. Material and Construction: Sheet metal sized and shaped as indicated, NEMA 3R.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.
- E. Wireway Covers: Flanged-and-gasketed type.
- F. Finish: Manufacturer's standard enamel finish.

## 2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturer:
  1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
  2. Emerson/General Signal; Appleton Electric Company.
  3. Erickson Electrical Equipment Co.
  4. Hoffman.
  5. Hubbell, Inc.; Killark Electric Manufacturing Co.
  6. O-Z/Gedney; Unit of General Signal.
  7. RACO; Division of Hubbell, Inc.
  8. Robroy Industries, Inc.; Enclosure Division.
  9. Scott Fetzer Co.; Adalet-PLM Division.
  10. Spring City Electrical Manufacturing Co.
  11. Thomas & Betts Corporation.
  12. Walker Systems, Inc.; Wiremold Company (The).
  13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
  1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

- F. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

## 2.6 EXPANSION FITTINGS:

- A. Manufacturer:
  - 1. O-Z Gedney; Unit of General Signal.
- B. Expansion Fittings: Malleable Iron, hot dipped galvanized, weatherproof suitable for raceway and applications
  - 1. Coordinate expansion requirements with Architect.

## 2.7 FACTORY FINISHES

- A. Finish: provide manufacturer's standard prime-coat finish ready for field painting for:
  - 1. Raceways
- B. Finish: provide manufacturer's standard paint applied before shipping to factory-assembled products for:
  - 1. Enclosures: Standard Grey in electrical rooms.
  - 2. Cabinets: Standard Grey in electrical rooms.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Outdoors:
  - 1. Exposed: Rigid steel or IMC.
  - 2. Concealed: Rigid steel or IMC.
  - 3. Underground, Single Run: RNC (except coated or wrapped rigid steel for bends greater than 22 degrees), coated or wrapped rigid steel.
  - 4. Underground, Grouped: RNC (except coated or wrapped rigid steel for bends greater than 22 degrees), coated or wrapped rigid steel.
  - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 6. Boxes and Enclosures: NEMA 250, Type 3R.
- B. Indoors:
  - 1. Exposed:
    - a. Above 6' from finished floor: EMT, IMC, or Rigid Steel.
    - b. Below 6' from finished floor, or subject to mechanical damage: IMC, or Rigid Steel.
  - 2. Underground: refer to underground installation selections in outdoor paragraph above.
  - 3. Concealed: EMT, or Rigid Steel.
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 5. Damp or Wet Locations: Rigid steel conduit.
  - 6. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
- C. Minimum Raceway Size:
  - 1. Metallic Conduits: 3/4-inch trade size (DN 21) except 1/2" C trade size (DN 16) for low voltage automatic temperature control or motor control wiring.

2. Nonmetallic Conduits: 3/4-inch trade size (DN 21).

- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid Metal Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated. Engage a minimum of five full threads.
  2. Intermediate Metal Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated. Engage a minimum of five full threads.
  3. PVC Externally Coated or wrapped Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.
  4. EMT: set screw or compression for dry interior locations; compression for damp or wet locations; compression with tape for installations in concrete slabs above grade.
  5. Building Expansion joints: use expansion fittings with 36" of wrapped metal raceways on either side of joint.

### 3.2 INSTALLATION

- A. Layout of electrical boxes: Do not scale electrical drawings.
1. Coordinate with architectural elevations. Where outlets are not identified on the elevations, refer mounting height decisions to the Architect. If counters or work surfaces are shown refer mounting height decisions, whether above or below counter, to the Architect. Coordinate location of switches with actual door swings.
  2. Verify final locations with field measurements and with the requirements of the actual equipment to be connected as determined from shop drawings.
- B. Outlet Boxes:
1. Frame construction: 4"X4"X1-1/2" with suitable plaster-ring, except:
    - a. 2-1/8" deep for boxes with 3 conduit entrances or for communication outlets
    - b. 4-11/16" boxes for boxes with 4 or more conduits.
  2. Masonary or concrete construction: 1g or multiple gang by 3-1/2" deep.
  3. Fixture Outlets: minimum 4" outlet box with 3/8" fixture stud supported adequately for minimum of 200 lbs.
  4. Do not use gangable boxes.
- C. Keep raceways at least 12 inches (300 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- D. Complete raceway installation before starting conductor installation.
- E. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."
- F. Install temporary closures to prevent foreign matter from entering raceways.
- G. Stub-ups: Embed coupling flush with finished floor. If to remain a spare, the flush plug is to remain in the coupling.
- H. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated. Make bends in parallel or banked runs from same centerline to make bends parallel.
1. Nonmetallic Conduits: Use rigid elbows for all bends 22 degrees or greater.
  2. Communication Systems Raceways: comply with long sweep radius elbows minimum dimensions in Table 5.2-1 of ANSI/TIA/EIA-569A for all bends or offsets for backbone cables.
- I. Raceways below grade: Install RNC or wrapped/coated Rigid Steel minimum 24" below grade,



unless specifically noted otherwise. Where noted encase in concrete.

- J. Conceal conduit and EMT within finished walls, ceilings, and floors, except at surface mounted panels and apparatus or unless otherwise indicated. Install surface raceways only where indicated or where directed by Architect.
  - 1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
  - 2. Install surface raceways in rooms where surface mounted panels are indicated or for exposed equipment in mechanical, electrical, or communication rooms.
- K. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least **2 inches (50 mm)** of concrete cover.
  - 1. Maximum conduit size: Lesser of **1-inch trade size (DN 27)** or 1/3 the concrete cover.
    - a. For conduits larger than **1-inch trade size (DN 27)**, consult structural engineer for additional structural supports or other options.
  - 2. Layout: Route conduits without crossovers. Space conduit at least 18" apart. Space raceways laterally to prevent voids in concrete.
    - a. Where concentrations of conduit occur, support slab independent of steel deck. Coordinate with structural engineer.
  - 3. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
  - 4. Install taped compression type fittings or fittings approved for such use.
  - 5. Change from nonmetallic tubing to rigid steel conduit before rising above the floor.
- L. Raceways Penetrating foundation walls: Install rigid conduit through the foundation wall or 3' each side.
- M. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
  - 1. Run parallel or banked raceways together on common supports.
  - 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- N. Join raceways with fittings designed and approved for that purpose and make joints tight.
  - 1. Use insulating bushings to protect conductors.
- O. Tighten set screws of threadless fittings with suitable tools.
- P. Cap open ends of empty conduit to keep out debris until the project is completed.
- Q. Terminations:
  - 1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. For RMC and IMC, use two locknuts, one inside and one outside box and a bushing. For EMT, use insulated throats or plastic bushings (except for grounding bushings where required).
  - 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
  - 3. Service Conduits or conduits installed in concentric/eccentric knock-outs or reducing washers: terminate raceway with grounding bushings.
- R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than **200-lb (90-kg)** tensile strength. Leave at least **12 inches (300 mm)** of slack at each end of pull wire. Plug empty raceways at both ends.

- S. Low Voltage, Telephone, and Signal System Raceways, **2-Inch Trade Size (DN 53)** and Smaller: In addition to above requirements, install raceways in maximum lengths of **150 feet (45 m)** and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
- T. Install seals for conduit penetrations of slabs on grade and exterior walls below grade. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal.
- U. Roof Penetrations: Install flashings for conduit penetrations of roofs under the direct supervision of the roofing installer.
- V. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where conduits pass through airtight spaces or plenums to prevent air leakage.
  - 3. Where conduits pass from hazardous areas to nonhazardous.
  - 4. Where otherwise required by NFPA 70.
- W. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used **6 inches (150 mm)** above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- X. Raceway Cleaning: Prevent accumulation of water, dirt or concrete in raceways. Where water or foreign matter have entered raceways, thoroughly clean or replace conduits where such accumulation cannot be removed by methods approved by this Engineer.
- Y. Flexible Connections: Use maximum of **72 inches (1830 mm)** of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.
- Z. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.
- AA. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

### 3.3 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

### 3.4 CLEANING

- A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed

finishes and repair damaged finishes.

END OF SECTION 16130

## SECTION 16140 - WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Single and duplex receptacles, ground-fault circuit interrupters.
  - 2. Device wall plates.

#### 1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. PVC: Polyvinyl chloride.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Field quality-control test reports.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

#### 1.6 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
  - 1. Cord and Plug Sets: Match equipment requirements.

### PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Wiring Devices:
    - a. Bryant Electric, Inc./Hubbell Subsidiary.
    - b. Eagle Electric Manufacturing Co., Inc.
    - c. Hubbell Incorporated; Wiring Device-Kellems.
    - d. Leviton Mfg. Company Inc.
    - e. Pass & Seymour/Legrand; Wiring Devices Div.

## 2.2 RECEPTACLES

- A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498.
  - 1. Thermoplastic face.
  - 2. Thermoset base.
  - 3. Back and side wired.
  - 4. Rating: 20 A minimum
- B. GFCI Receptacles: Straight blade, feed-through type, Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a **2-3/4-inch- (70-mm-)** deep outlet box without an adapter.

## 2.3 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
  - 1. Plate-Securing Screws: Metal with head color to match plate finish, except screwless devices for locations where only dimmers are shown.
  - 2. Material for Wet Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

## 2.4 FINISHES

- A. Color:
  - 1. Wiring Devices Connected to Normal Power System: Black, unless otherwise indicated or required by NFPA 70.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install devices and assemblies level, plumb, and square with building lines.
- B. Install wall dimmers with capacity to achieve 60% of circuit loads indicated on drawings after derating for ganging according to manufacturer's written instructions.
- C. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.
- D. Install control wiring for electronic fluorescent dimmers (low voltage or line voltage) per manufacturers written instructions.
- E. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single,

multigang wall plates.

- F. Wallplates and coverplates: install wallplates and coverplates for all outlets, including blank outlets.
- G. GFI Devices: Install separate GFCI devices, except where installed under the same multi-gang plate.
- H. Remove wall plates and protect devices and assemblies during painting.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

### 3.2 IDENTIFICATION

- A. Comply with Division 16 Section "Electrical Identification."
  - 1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with color-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.
    - a. Black letters on light colored plates.
    - b. White on dark colored plates.

### 3.3 CONNECTIONS

- A. Ground equipment according to Division 16 Section "Grounding and Bonding."
- B. Connect wiring according to Division 16 Section "Conductors and Cables."
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
  - 2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 16140

**Standard Wiring Device Schedule**

Note to Bidders: Comply with Section 16140 of the specifications. The catalog numbers listed below have been carefully prepared with the assistance of the manufacturer's representatives with the objective of assisting the bidders in determining the quality and ratings of the wiring device specified; however, the catalog numbers may not be complete or accurate. In addition, the color of the wiring device is not intended to be determined by the catalog numbers listed below, but shall be selected by the Architect as indicated in the specification. Each manufacturer prior to bidding shall compare catalog numbers shown with the description and shall notify the Architect/Engineer of any discrepancies.

NEMA	DESCRIPTION	CATALOG NUMBERS
NEMA 5-20R	20A, 125V 2 pole 3 wire duplex grounding receptacles. Nylon or Lexan Faces. Back and side wired. Comply with FS W-C-596 and UL 498.	Bryant 5352 Hubbell CR5352 Leviton 5352 P&S 5352
NEMA 5-20R GFCI	20A, 125V 2 pole 3 wire duplex feed thru GFCI receptacles with indicator light. Nylon or Lexan decorator faces. Back and side wired. Internal components shall comply with FS W-C-596 where applicable. Comply with UL 498 and UL 493.	Bryant GFR53FT Hubbell GF5352 Leviton 6898 P&S 2091 S
20A Single Pole	20A single pole 125V-277V standard toggle switch labeled as complying UL standard 20 and with Federal Specification W-S-896. Provide Nylon or Lexan face, back and side wired. Rated 1 HP 120V.	Hubbell CS1221 Leviton 1221 P & S 521 Bryant 4901
20A Three-way	20A three-way 125V-277V standard toggle switch labeled as complying UL standard 20 and with Federal Specification W-S-896. Provide Nylon or Lexan face, back and side wired. Rated 1 HP 120V.	Hubbell CS1223 Leviton 1223 P & S 523 Bryant 4903

## SECTION 16145 - LIGHTING CONTROL DEVICES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following lighting control devices:
  - 1. Indoor occupancy sensors.
- B. Related Sections include the following:
  - 1. Division 16 Section "Wiring Devices" for manual light switches.

#### 1.3 DEFINITIONS

- A. LED: Light-emitting diode.
- B. PIR: Passive infrared.
- C. US: Ultrasonic.
- D. DT: Dual Technology

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
  - 1. Lighting plan showing location, orientation, and coverage area of each sensor.
  - 2. Interconnection diagrams showing field-installed wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

#### 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

#### 1.6 COORDINATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

### PART 2 - PRODUCTS



## 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

## 2.2 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS

- A. Line-Voltage Surge Protection: An integral part of the devices for 120- and 277-V solid-state equipment. For devices without integral line-voltage surge protection, field-mounting surge protection shall comply with IEEE C62.41 and with UL 1449.

## 2.3 INDOOR OCCUPANCY SENSORS

- A. Manufacturers:
  - 1. Hubbell Lighting Inc.
  - 2. Watt Stopper (The).
  - 3. Sensor Switch
- B. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.
  - 1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
  - 2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
  - 3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
  - 4. Mounting:
    - a. Sensor: Suitable for mounting in any position on a standard outlet box.
    - b. Relay: Externally mounted though a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
    - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
  - 5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
  - 6. Bypass Switch: Override the on function in case of sensor failure.
- C. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on and off functions shall be selectable in the field by operating controls on unit.
  - 1. Sensitivity Adjustment: Separate for each sensing technology.
  - 2. Detector Sensitivity: Detect occurrences of 6-inch (150-mm) minimum movement of any portion of a human body that presents a target of at least 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving at least 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
  - 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

## 2.4 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG, complying with Division 16 Section "Conductors and Cables."

- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded copper conductors not smaller than No. 18 AWG, complying with Division 16 Section "Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded copper conductors not smaller than No. 14 AWG, complying with Division 16 Section "Conductors and Cables."
- D. Install unshielded, twisted-pair cable for control and signal transmission conductors, complying with Division 16 Section "Voice and Data Communication Cabling."

## PART 3 - EXECUTION

### 3.1 SENSOR INSTALLATION

- A. Install and aim sensors in locations to achieve at least 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

### 3.2 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 16 Section "Conductors and Cables." Minimum conduit size shall be **3/4 inch (20 mm)**.
- B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Install field-mounting transient voltage suppressors for lighting control devices in Category A locations that do not have integral line-voltage surge protection.
- D. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
- F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 16 Section "Electrical Identification."
- B. Label time switches and contactors with a unique designation.

### 3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
  - 2. Operational Test: Verify actuation of each sensor and adjust time delays.
- B. Remove and replace lighting control devices where test results indicate that they do not comply with specified requirements.

- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.5 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose.

END OF SECTION 16145

## SECTION 16410 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes individually mounted enclosed switches and circuit breakers used for the following:
  - 1. Motor and equipment disconnecting means.
- B. Related Sections include the following:
  - 1. Division 16 Section "Fuses" for fusible devices.

#### 1.3 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.
- B. RMS: Root mean square.
- C. SPDT: Single pole, double throw.
- D. MCP: Motor Circuit Protectors (Adjustable instantaneous trip circuit breakers).

#### 1.4 SUBMITTALS

- A. Product Data: For each type of switch, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each switch and circuit breaker.
  - 1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations and layout of installed devices, equipment features, and ratings. Include the following:
    - a. Enclosure types and details for types other than NEMA 250, Type 1.
    - b. Current and voltage ratings.
    - c. Short-circuit current rating.
    - d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
  - 2. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- C. Qualification Data: Submit data for testing agencies indicating that they comply with qualifications specified in "Quality Assurance" Article.
- D. Field Test Reports: Submit written test reports and include the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

- E. Manufacturer's field service report.
- F. Maintenance Data: For enclosed switches and circuit breakers and for components to include in maintenance manuals specified in Division 1. In addition to requirements specified in Division 1 Section "Closeout Procedures," include the following:
  - 1. Routine maintenance requirements for components.
  - 2. Manufacturer's written instructions for testing and adjusting switches and circuit breakers.
  - 3. Time-current curves, including selectable ranges for each type of circuit breaker.

#### 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NEMA AB 1 and NEMA KS 1.
- C. Comply with NFPA 70.
- D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
  - 1. Ambient Temperature: Not less than **minus 22 deg F (minus 30 deg C)** and not exceeding **104 deg F (40 deg C)**.
  - 2. Altitude: Not exceeding **6600 feet (2000 m)**.

#### 1.7 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

#### 1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Spares: For the following:
    - a. Fuses for Fused Switches: refer to Div 16 section "Fuses".

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Fusible Switches:
    - a. Eaton Corp.; Cutler-Hammer Products.
    - b. General Electric Co.; Electrical Distribution & Control Division.
    - c. Siemens Energy & Automation, Inc.
    - d. Square D Co.

## 2.2 ENCLOSED SWITCHES

- A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.
- B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, with clips to accommodate specified fuses, built-in fuse pullers arranged to facilitate fuse removal, lockable handle with two padlocks, and interlocked with cover in closed position.

## 2.3 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
  - 1. Outdoor Locations: NEMA 250, Type 3R.

## 2.4 FACTORY FINISHES

- A. Finish: Manufacturer's standard gray paint applied to factory-assembled and -tested enclosures before shipping.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Equipment Disconnects
  - 1. Maximum elevation: 48".
  - 2. Locate lockable disconnect near each motor complying with clearance requirements.
  - 3. Multiple speed motors: provide switch in all motor leads.

## 3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."
- B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.
- C. Fusible Switch Labels: Label each enclosure with "REPLACE WITH CURRENT LIMITING FUSES ONLY. CATALOG NUMBER: (FUSE CAT. NO.)."

## 3.4 CONNECTIONS

- A. Install equipment grounding connections for switches and circuit breakers with ground continuity to main electrical ground bus.

- B. Install power wiring. Install wiring between switches and circuit breakers, and control and indication devices.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.5 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
  - 1. Test insulation resistance for each enclosed switch, circuit breaker, component, and control circuit.
  - 2. Test continuity of each line- and load-side circuit.
- B. Testing: After installing enclosed switches and circuit breakers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
  - 1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
  - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

### 3.6 ADJUSTING

- A. Set field-adjustable switches and circuit-breaker trip ranges.

### 3.7 CLEANING

- A. On completion of installation, inspect interior and exterior of enclosures. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 16410

## SECTION 16491 - FUSES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes cartridge fuses, rated 600 V and less, for use in switches, panelboards, switchboards, controllers, and motor-control centers; and spare fuse cabinets.

#### 1.3 DEFINITIONS

- A. RK1-TD: Class RK1, Time Delay
- B. RK5-TD: Class RK5, Time Delay

#### 1.4 SUBMITTALS

- A. Product Data: Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings for each fuse type indicated.
- B. Product Data: Include the following for each fuse type indicated:
  - 1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
  - 2. Let-through current curves for fuses with current-limiting characteristics.
  - 3. Time-current curves, coordination charts and tables, and related data.
  - 4. Fuse size for elevator feeders and elevator disconnect switches.
- C. Maintenance Data: For tripping devices to include in maintenance manuals specified in Division 1.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Provide fuses from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NEMA FU 1.
- D. Comply with NFPA 70.

#### 1.6 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F (4.4 deg C) or more than 100 deg F (38 deg C), apply manufacturer's ambient temperature adjustment factors to fuse ratings.

#### 1.7 COORDINATION



- A. Coordinate fuse ratings with HVAC and refrigeration equipment nameplate limitations of maximum fuse size.

## 1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged in original cartons or containers and identified with labels describing contents.
  - 1. Fuses: Quantity equal to 10 percent of each fuse type and size, but not fewer than 3 of each type and size.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper Industries, Inc.; Bussmann Div.
  - 2. Gould Shawmut.
  - 3. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

### 2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 FUSE APPLICATIONS

- A. Refer to drawings for fuse types and sizes.
  - 1. Motor fuse sizes: Field select motor fuse sizes using the class of fuse shown on the drawings and sizing the fuse based upon the motor nameplate information and by multiplying by 1.25 (except for special service motors).

### 3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

### 3.4 IDENTIFICATION

- A. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION 16491

## SECTION 16511 - INTERIOR LIGHTING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Interior lighting fixtures with lamps and ballasts.
  - 2. Lighting fixtures mounted on exterior building surfaces.
  - 3. Emergency lighting units.
  - 4. Exit signs.
- B. Related Sections include the following:
  - 1. Division 16 Section "Lighting Controls" for manual or programmable control systems employing low-voltage control wiring or data communication circuits.
  - 2. Division 16 Section "Wiring Devices" for manual wall-box dimmers for incandescent lamps.
  - 3. Division 16 Section "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
  - 4. Division 16 Section "Dimming Controls" for architectural dimming systems.

#### 1.3 DEFINITIONS

- A. BF: Ballast factor. Ratio of light output of a given lamp(s) operated by the subject ballast to the light output of the same lamp(s) when operated on an ANSI reference circuit.
- B. CRI: Color rendering index.
- C. CU: Coefficient of utilization.
- D. LER: Luminaire efficiency rating, which is calculated according to NEMA LE 5. This value can be estimated from photometric data using the following formula:
  - 1. LER is equal to the product of total rated lamp lumens times BF times luminaire efficiency, divided by input watts.
- E. RCR: Room cavity ratio.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of lighting fixture scheduled, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
  - 1. Physical description of fixture, including dimensions and verification of indicated parameters.
  - 2. Emergency lighting unit battery and charger.
  - 3. Fluorescent and high-intensity-discharge ballasts.
  - 4. Lamps.

- B. Shop Drawings: Show details of nonstandard or custom fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.
- C. Wiring Diagrams: Power, signal, and control wiring.
- D. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Closeout Procedures," include the following:
  - 1. Catalog data for each fixture. Include the diffuser, ballast, and lamps installed in that fixture.
- E. Warranties: Special warranties specified in this Section.
- F. Spare Parts: include spare parts materials and quantity.

#### 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  - 1. Test products to UL standards by nationally recognized testing laboratory, where an appropriate standard exists.
- B. Comply with NFPA 70.
- C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

#### 1.6 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

#### 1.7 WARRANTY

- A. Special Warranty for Emergency Lighting Unit Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
- B. Special Warranty for Fluorescent Ballasts: Manufacturer's standard form in which ballast manufacturer agrees to repair or replace ballasts that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period for Electronic Ballasts: Five years from date of Substantial Completion.
  - 2. Warranty Period for Electromagnetic Ballasts: Three years from date of Substantial Completion.

#### 1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.

2. Ballasts: 1 for every 100 of each type and rating installed. Furnish at least one of each type.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  1. Products: Subject to compliance with requirements, provide one of the products specified.

### 2.2 FIXTURES AND COMPONENTS, GENERAL

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
  1. Equip recessed fixtures with six foot flexible conduit whips for connection to external j-boxes, except that junction boxes may integral for prewired framing kits for incandescent and PL fluorescent downlights.
- B. Incandescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5A.
- C. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- D. HID Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B.
- E. Metal Parts: Free of burrs and sharp corners and edges.
- F. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- G. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- H. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
  1. White Surfaces: 92 percent.
  2. Specular Surfaces: 83 percent.
  3. Diffusing Specular Surfaces: 75 percent.
  4. Laminated Silver Metallized Film: 90 percent.
- I. Plastic Diffusers, Covers, and Globes:
  1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
    - a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless different thickness is scheduled.
    - b. UV stabilized.
  2. Glass: Annealed crystal glass, unless otherwise indicated.

### 2.3 LIGHTING FIXTURES

- A. Fixtures: Refer to Lighting Fixture Schedule on the drawings.

## 2.4 FLUORESCENT LAMP BALLASTS

- A. Description: Include the following features, unless otherwise indicated:
1. Designed for type and quantity of lamps indicated at full light output, unless 1.2 BF is specified.
    - a. Linear Electronic Ballasts: full light output is defined as .88 BF.
    - b. Linear Magnetic Ballasts: full light output is defined as .95 BF.
    - c. Compact Fluorescent Ballasts: full light output is defined as 1.0 BF.
  2. Interference: Comply with 47 CFR, Chapter 1, Part 18, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.
- B. Electronic ballasts (nondimming) for linear lamps shall include the following features, unless otherwise indicated:
1. Comply with NEMA C82.11.
  2. Ballast Type: Programmed start with two-step lamp starting to extend life of frequently started lamps; if not available from any manufacturer, provide rapid start.
  3. Sound Rating: A.
  4. Total harmonic distortion rating of less than 20 percent according to NEMA C82.11.
  5. Transient Voltage Protection: IEEE C62.41, Category A.
  6. Operating Frequency: 20 kHz or higher.
  7. Lamp Current Crest Factor: Less than 1.7.
  8. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.
- C. Ballasts for compact fluorescent lamps in recessed fixtures shall have the following features, unless otherwise indicated:
1. Type: Electronic.
  2. Power Factor: 90 percent, minimum.
  3. Flicker: Less than 5 percent.
  4. Lamp Current Crest Factor: Less than 1.7.
  5. Electronic Ballast Operating Frequency: 20 kHz or higher.
  6. Lamp end-of-life detection and shutdown circuit.
  7. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.
- D. Ballasts for compact lamps in nonrecessed fixtures shall include the following features, unless otherwise indicated:
1. Power Factor: 90 percent, minimum.
  2. Ballast Coil Temperature: 65 deg C, maximum.
  3. Transient Protection: Comply with IEEE C62.41 for Category A1 locations.
- E. Ballasts for dimmer-controlled fixtures shall comply with general and fixture-related requirements above for electronic ballasts and the following features:
1. Dimming Range: 100 to 5 percent of rated lamp lumens, unless specifically indicated otherwise.
  2. Ballast Input Watts: Can be reduced from 100 to 20 percent of normal as it dims.
  3. Compatibility: Certified by manufacturer for use with specific dimming system indicated.
- F. Ballasts for Low-Temperature Environments:
1. Temperatures 0 deg F (Minus 17 deg C) and Higher: Electronic or electromagnetic type rated for 0 deg F (Minus 17 deg C) starting temperature.
  2. Temperatures Minus 20 deg F (Minus 29 deg C) and Higher: Electromagnetic type designed for use with high-output lamps.

## 2.5 HIGH-INTENSITY-DISCHARGE LAMP BALLASTS

- A. General: Comply with NEMA C82.4 and UL 1029. Shall include the following features, unless otherwise indicated.
  - 1. Type: Constant-wattage autotransformer, pulse start, or regulating high-power-factor type.
  - 2. Minimum Starting Temperature: Minus 22 deg F (Minus 30 deg C) for single-lamp ballasts.
  - 3. Normal Ambient Operating Temperature: 104 deg F 40 deg C.
  - 4. Open-circuit operation that will not reduce average life.

## 2.6 EXIT SIGNS

- A. General: Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
  - 1. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum of rated lamp life.

## 2.7 FLUORESCENT EMERGENCY LIGHTING FIXTURES

- A. Internal Type: Self-contained, modular, battery-inverter unit factory mounted within fixture body. Comply with UL 924.
  - 1. Emergency Connection: Operate one fluorescent lamp continuously to 1100 lumens minimum. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
  - 2. Night Light Connection: Operate one fluorescent lamp continuously.
  - 3. Test Switch and Light-Emitting-Diode Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
  - 4. Battery: Sealed, maintenance-free, with minimum seven-year nominal life.
  - 5. Charger: Fully automatic, solid-state, constant-current type.

## 2.8 FLUORESCENT LAMPS

- A. Low-Mercury Lamps: Comply with Federal toxic characteristic leaching procedure (TCLP) test, and yield less than 0.2 mg of mercury per liter, when tested according to NEMA LL 1.
- B. T8 rapid-start low-mercury lamps, CRI of 82 (minimum), color temperature of 3500 K, and average rated life of 20,000 hours, unless otherwise indicated.
- C. T5 programmed-start low-mercury lamps, CRI of 85 (minimum), color temperature of 3500 K, and average rated life of 20,000 hours, unless otherwise indicated.
- D. Compact Fluorescent Lamps: CRI 80 (minimum), color temperature 3500, average rated life of 10,000 hours at 3 hours operation per start, unless otherwise indicated.

## 2.9 HIGH-INTENSITY-DISCHARGE LAMPS

- A. Metal-Halide Lamps: ANSI C78.1372, wattage and burning position as scheduled, CRI 65 (minimum), and color temperature 3000.

## 2.10 FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 16 Section "Basic Electrical Materials and Methods" for channel- and angle-iron supports and nonmetallic channel and angle supports.

- B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated, 12 gage (2.68 mm).
- E. Rod Hangers: 3/16-inch- (5-mm-) minimum diameter, cadmium-plated, threaded steel rod.
- F. Aircraft Cable Support: Use cable, anchorages, and intermediate supports recommended by fixture manufacturer.

## 2.11 FINISHES

- A. Fixtures: Manufacturers' standard, unless otherwise indicated.
  1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
  2. Metallic Finish: Corrosion resistant.

## 2.12 SOURCE QUALITY CONTROL

- A. Provide services of a qualified, independent testing and inspecting agency to factory test fixtures with ballasts and lamps; certify results for electrical ratings and photometric data.
- B. Factory test fixtures with ballasts and lamps; certify results for electrical ratings and photometric data.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Fixtures: Set level, plumb, and square with ceilings and walls. Adjust trims for recessed fixtures to eliminate light leaks. Install lamps in each fixture.
  1. Install fixtures with the separation from combustible material as required by lighting fixture rating, per manufacturer's written instructions; in no case, install recessed fixture within 1/2" of combustible material.
- B. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.
  1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches (150 mm) from fixture corners.
  2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
  3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel or at the intersection of four tiles, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.
  4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- C. Suspended Fixture Support: As follows:
  1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
  2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

3. Extruded fixtures, Continuous Rows: Use tubing or stem for wiring at power points and cable for suspension for each unit length of fixture chassis. Include cable or stem at each end.

- D. Adjust aimable fixtures to provide required light intensities.

### 3.2 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.3 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
  1. Clean transparent materials. Replace chipped or broken lenses and other damaged transparent materials.
  2. Restore reflective surfaces to their reflective conditions.
  3. Clean light fixtures and lamps.
- B. Verify normal operation of each fixture after installation.
- C. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify normal transfer to battery power source and retransfer to normal.
- D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.
- E. Corroded Fixtures: During warranty period, replace fixtures that show any signs of corrosion.

END OF SECTION 16511



## SECTION 16860 - FIRE ALARM

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes fire alarm systems with manual stations, detectors, signal equipment, controls, and devices.

#### 1.3 DEFINITIONS

- A. FACP: Fire alarm control panel.
- B. LED: Light-emitting diode.
- C. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

#### 1.4 SYSTEM DESCRIPTION

- A. General: Connection to an existing system for new remodel area initiating and indicating devices.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Certificates: Signed by manufacturers of system components certifying that products furnished comply with requirements.
- C. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.
- D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Comply with NFPA 72.
- E. Maintenance Data: For fire alarm systems to include in maintenance manuals specified in Division 1. Comply with NFPA 72.
- F. Submissions to Authorities Having Jurisdiction: In addition to distribution requirements for Submittals specified in Division 1 Section "Submittals," make an identical submission to authorities having jurisdiction. Include copies of annotated Contract Drawings as needed to depict component locations to facilitate review. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Architect for review.
- G. Certificate of Completion: Comply with NFPA 72.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is an authorized representative of the FACP manufacturer for both installation and maintenance of units required for this Project.
- B. Manufacturer Qualifications: A firm experienced in manufacturing systems similar to those indicated for this Project and with a record of successful in-service performance.
- C. Source Limitations: Obtain fire alarm system components through one source from a single manufacturer.
- D. Compliance with Local Requirements: Comply with applicable building code, local ordinances and regulations, and requirements of authorities having jurisdiction.
- E. Comply with NFPA 72.

## 1.7 SEQUENCING AND SCHEDULING

- A. Existing Fire Alarm Equipment: Maintain fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of the new fire alarm system, remove existing disconnected fire alarm equipment and restore damaged surfaces.
  - 1. Package operational fire alarm and detection equipment that has been removed and deliver to Owner.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CERBERUS PYROTRONICS #MXL-1Q

### 2.2 NOTIFICATION APPLIANCES

- A. Description: Equip for mounting as indicated and have screw terminals for system connections.
  - 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.
- B. Horns: Electronic-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns produce a sound-pressure level of 90 dB, measured 10 feet (3 m) from the horn.
- C. Visible Alarm Devices: Xenon strobe lights listed under UL 1971 with clear or nominal white polycarbonate lens. Mount lens on an aluminum faceplate. The word "FIRE" is engraved in minimum ~~1-inch~~ (25-mm-) high letters on the lens.
  - 1. Rated Light Output: 110 candela.
  - 2. Synchronization option.
  - 3. Strobe Leads: Factory connected to screw terminals.

### 2.3 ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module listed for use in providing a multiplex system address for listed fire and sprinkler alarm-initiating devices with normally open contacts.

- B. Integral Relay: Capable of providing a direct signal to the elevator controller to initiate elevator recall or to a circuit-breaker shunt trip for power shutdown.

## 2.4 WIRE

- A. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
  - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
  - 2. Line-Voltage Circuits: No. 12 AWG, minimum.
- B. Power-Limited Circuits: NFPA 70, Types FPL, FPLR, or FPLP, as recommended by manufacturer.

## PART 3 - EXECUTION

### 3.1 EQUIPMENT INSTALLATION

- A. Ceiling-Mounted Smoke Detectors: Not less than 4 inches (100 mm) from a side wall to the near edge. For exposed solid-joist construction, mount detectors on the bottom of joists. On smooth ceilings, install not more than 30 feet (9 m) apart in any direction.
- B. Wall-Mounted Smoke Detectors: At least 4 inches (100 mm), but not more than 12 inches (300 mm), below the ceiling.
- C. Smoke Detectors near Air Registers: Install no closer than 60 inches (1520 mm).
- D. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Combine audible and visible alarms at the same location into a single unit.
- E. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling.
  - 1. Synchronization: synchronize any two strobes located such that they are visible from the same location.

### 3.2 WIRING INSTALLATION

- A. Wiring Method: Install wiring in metal raceway according to Division 16 Section "Raceways and Boxes." Conceal raceway except in unfinished spaces and as indicated.
- B. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by the manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- C. Cable Taps: Use numbered terminal strips in junction, pull and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- D. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits.

Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

### 3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Electrical Identification."
  - 1. Paint all fire alarm system junction boxes, device boxes and pull boxes with red paint.
- B. Install instructions frame in a location visible from the FACP.
- C. Prepare laminated drawings showing each device and identifying the device address or zone

### 3.4 GROUNDING

- A. Ground cable shields and equipment according to system manufacturer's written instructions to eliminate shock hazard and to minimize, to the greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- B. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding.
- C. Install grounding electrodes of type, size, location, and quantity as indicated. Comply with installation requirements in Division 16 Section "Grounding."
- D. Ground equipment and conductor and cable shields. For audio circuits, minimize, to the greatest extent possible, ground loops, common-mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

### 3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and connections and to supervise pretesting, testing, and adjustment of the system. Report results in writing.
- B. Pretesting: After installation, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the compliance of the system with requirements of Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones, and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.
- C. Report of Pretesting: After pretesting is complete, provide a letter certifying the installation is complete and fully operable, including the names and titles of witnesses to preliminary tests.
- D. Final Test Notice: Provide a minimum of 10 days' notice in writing when the system is ready for final acceptance testing.
- E. Minimum System Tests: Test the system according to procedures outlined in NFPA 72. Minimum required tests are as follows:
  - 1. Verify the absence of unwanted voltages between circuit conductors and ground.
  - 2. Test all conductors for short circuits using an insulation-testing device.
  - 3. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter. Record the circuit resistance of each circuit on record drawings.

4. Verify that the control unit is in the normal condition as detailed in the manufacturer's operation and maintenance manual.
  5. Test initiating and indicating circuits for proper signal transmission under open circuit and ground fault conditions. One connection each should be opened at not less than 10 percent of initiating and indicating devices. Observe proper signal transmission according to class of wiring used.
  6. Test each initiating and indicating device for alarm operation and proper response at the control unit.
    - a. Test smoke detectors with actual products of combustion.
    - b. Test each heat detector with hair dryer or other means approved by the manufacturer.
    - c. Test fan shut down, sprinkler flow and tamper switches, door closers, magnetic door holders, and elevator return.
  7. Test the system for all specified functions according to the approved operation and maintenance manual. Systematically initiate specified functional performance items at each station, including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, signal tones, and annunciator indications.
  8. Test Both Primary and Secondary Power: Verify by test that the secondary power system is capable of operating the system for the period and in the manner specified.
    - a. Disconnect fire alarm from primary power source 24 hours prior to test, or longer as specified. Test all indicating devices to determine whether audio and visual devices comply with testing requirements for a 15 minute test.
- F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets Specifications and complies with applicable standards.
- G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log on the satisfactory completion of tests.
- H. Tag all equipment, stations, and other components at which tests have been satisfactorily completed.
- 3.6 CLEANING AND ADJUSTING
- A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Touch up scratches and marred finish to match original finish. Clean unit internally using methods and materials recommended by manufacturer.
- 3.7 DEMONSTRATION
- A. Engage a factory-authorized service representative to train Owner's maintenance personnel as specified below:
1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, adjusting, and maintaining equipment and schedules. Provide a minimum of 8 hours' training.
  2. Training Aid: Use the approved final version of the operation and maintenance manual as a training aid.
  3. Schedule training with Owner, through Architect, with at least seven days' advance notice.
- 3.8 ON-SITE ASSISTANCE

- A. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels, controls, and sensitivities to suit actual occupied conditions. Provide up to three requested visits to Project site for this purpose.

END OF SECTION 16860